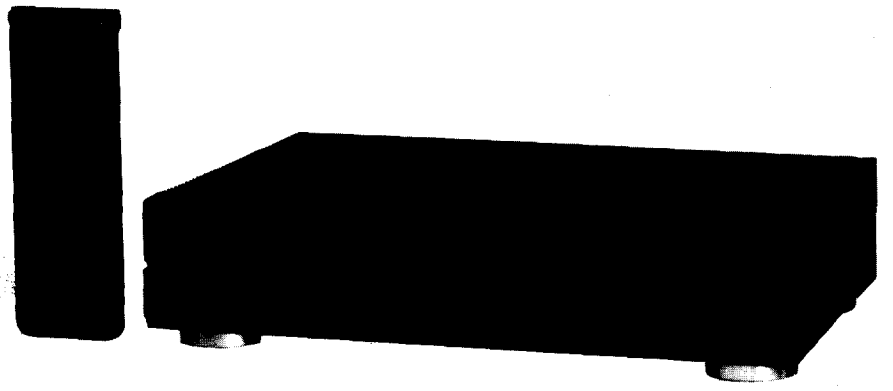
EV-S550
RMT-455

SERVICE MANUAL

US Model
Canadian Model



Video 8

For MECHANISM ADJUSTMENTS, refer to the "8 mm Video MECHANICAL ADJUSTMENT MANUAL III" (9-972-732-11).

SPECIFICATIONS

System

Video recording system	Rotary two-head helical scanning FM system
Audio recording system	
Standard:	Rotary head, FM system (2 channels)
PCM:	PCM system (2 channels)
Video signal	EIA standard, NTSC color
Usable cassettes	8 mm video format cassettes
Tape speed	SP: approx. 1.43 cm/sec. LP: approx. 0.72 cm/sec.
Recording/playback time	SP: 2 hrs. LP: 4 hrs. (with Sony P6-120 cassette)
Fast-forward/rewind time	Approx. 4 min. (with Sony P6-120 cassette)

Tuner section

Channel coverage	VHF channels 2-13 UHF channels 14-69 Cable TV channels 1,14-36, 66-94,98,99,100~125
VHF output signal	Channel 3 or 4 (selectable) 75 ohms, unbalanced
Antenna	75 ohms, F-type connector for VHF/UHF IN and VHF/UHF OUT

PCM

Sampling frequency	31.5 kHz
Audio frequency	20 ~ 15 kHz
Dynamic range	More than 85 dB
Wow and flutter	Less than 0.005 % RMS

Inputs and outputs

Video input	Phono jack 1 Vp-p, 75 ohms, unbalanced, sync negative
Video output	Phono jack 1 Vp-p, 75 ohms, unbalanced, sync negative
Audio input	Phono jack ×2 −7.5 dBs (0 dBs = 0.775 V rms) more than 47 kilohms
Audio output	Phono jack ×2 −7.5 dBs (327 mV) (at load impedance 47 kilohms) Less than 10 kilohms
Microphone input	Minijack −60 dBs, for low impedance microphone

– Continued on next page –

MICROFILM

STEREO VIDEO CASSETTE DECK

SONY®

Headphone jack	Stereo minijack −26 dBs, 8 ohms
AC outlet	120 V AC, 60 Hz, 400 W (max.), unswitched
DC out for Camcorder	7.5 V DC, 1.6 A
Control L	Stereo mini-mini jack

Timer

Clock	Crystal lock
Timer indication	12-hour cycle
Timer setting	Only for recording 6 events/1 month max.

General

Power requirements	120 V AC, 60 Hz
Power consumption	42W (max.)
Operating temperature	5°C to 40°C (41°F to 104°F)
Storage temperature	−20°C to +60°C (−4°F to +140°F)
Dimensions	Approx. 430 × 100 × 302 mm (w/h/d) Approx. 17 × 4 × 12 inch
Weight	Approx. 5.2 kg (11 lb $^1/_2$ oz)

Accessories supplied

See pages 8,9.
(of Instruction Manual for EV-S550)

Remote Commander RMT-455

Remote control system	Infrared control
Command mode	Selectable VTR 1, 2 or 3
Power reqirements	3V DC 2 size AA batteries (IEC designation R6)
Dimensions	Approx. 77.5 × 20 × 219 mm (w/h/d) Approx. 3 × $^3/_4$ × 8 $^1/_2$ inches incl. projecting parts and controls
Weight	Approx. 170 g (2.2 oz) without batteries

Design and specifications subject to change without notice.

SAFETY CHECK-OUT

After correcting the original service problem, perform the following safety checks before releasing the set to the customer:

1. Check the area of your repair for unsoldered or poorly-soldered connections. Check the entire board surface for solder splasher and bridges.
2. Check the interboard wiring to ensure that no wires are "pinched" or contact high-wattage resistors.
3. Look for unauthorized replacement parts, particularly transistors, that were installed during a previous repair. Point them out to the customer and recommend their replacement.
4. Look for parts which, though functioning, show obvious signs of deterioration. Point them out to the customer and recommend their replacement.
5. Check the B+ voltage to see it is at the values specified.

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK ⚠ OR DOTTED LINE WITH MARK ⚠ ON THE SCHEMATIC DIAGRAMS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

ATTENTION AU COMPOSANT AYANT RAPPORT À LA SÉCURITÉ!

LES COMPOSANTS IDENTIFIÉS PAR UNE MARQUE ⚠ SUR LES DIAGRAMMES SCHÉMATIQUES ET LA LISTE DES PIÉCES SONT CRITIQUES POUR LA SÉCURITÉ DE FONCTIONNEMENT. NE REMPLACER SES COMPOSANTS QUE PAR DES PIÉCES SONY DONT LES NUMÉROS SONT DONNÉS DANS CE MANUEL OU DANS LES SUPPLÉMENTS PUBLIÉS PAR SONY.

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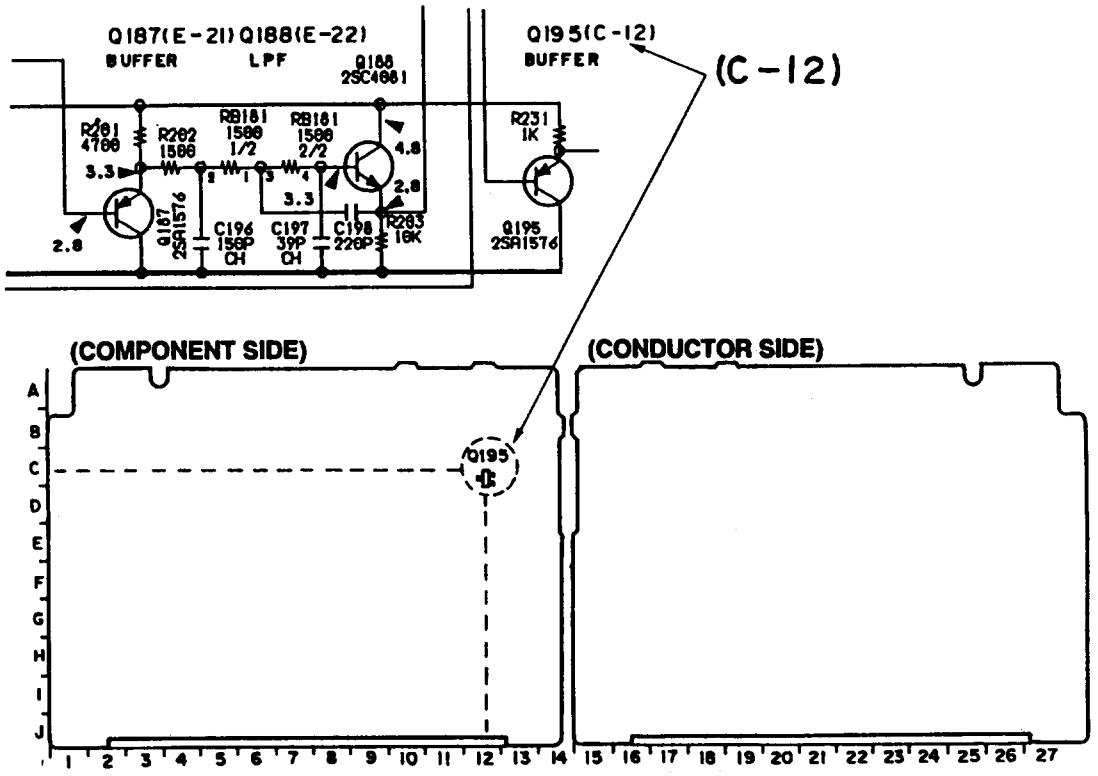
SECTION 1
SERVICE NOTE

[SEMICONDUCTOR LOCATION]

In this service manual, the mounted locations of the semiconductors (IC, transistor, diodes) are indicated in red sa shown below. This enables to find the location on the board easily when servicing.



1-1. SERVICE MODE

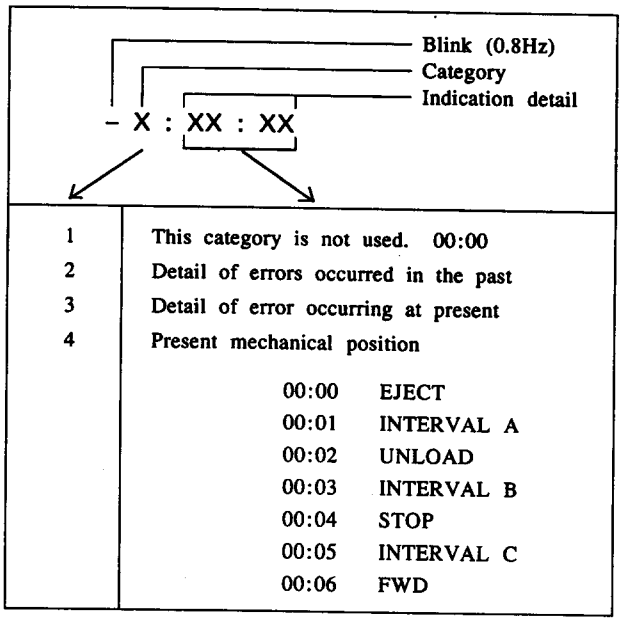
This equipment is provided with self-diagnostic function for the system control circuits. By selecting service mode, the state of error is indicated digitally on the FL indication tube. Use this function for service, failure analysis, etc.

1-1-1. How to select service mode

1) Remove the bottom plate of the unit.
2) Connect the TEST pin TP001 equipped on the pattern surface side of the ST-41 board, to GND. Thus, service mode is effected.
3) Every time the FF key (on the main unit or remote controller) is pressed, the category changes.
4) After completion of servicing, disconnect TP001 of board ST-41 out of the GND.

1-1-2. Indication methods

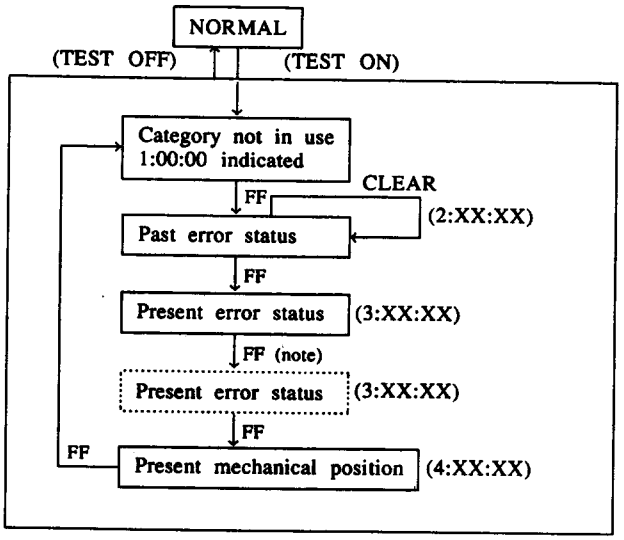
- Indication zones of the hour, minute and second counter in the FL indication tube are diverted.



1	This category is not used. 00:00
2	Detail of errors occurred in the past
3	Detail of error occurring at present
4	Present mechanical position

00:00 EJECT
00:01 INTERVAL A
00:02 UNLOAD
00:03 INTERVAL B
00:04 STOP
00:05 INTERVAL C
00:06 FWD

1-1-3. Status transition diagram



Note: If there are several statuses of present errors, all are indicated.

Service mode error indication

Error state		PRESENT EMG.indication (-3:XX:XX)	LAST EMG.indication (-2:XX:XX)
No error		00:00	00:00
Loading motor		00:01	00:01
Reel error in unloading		00:02	00:02
Other REEL errors		00:03	00:03
Capstan error		00:04	00:04
FG error upon starting drum	(0)	00:05	00:05
	(1)	01:05	00:14
	(2)	02:05	00:15
No PG upon starting drum	(0)	00:06	00:06
	(1)	01:06	00:14
	(2)	02:06	00:15
FG error during normal drum operation	(0)	00:07	00:07
	(1)	01:07	00:14
	(2)	02:07	00:15
No PG during normal drum operation	(0)	00:08	00:08
	(1)	01:08	00:14
	(2)	02:08	00:15
Phase during normal drum operation	(0)	00:09	00:09

(1) Loading
(2) Upon unloading
(3) Others

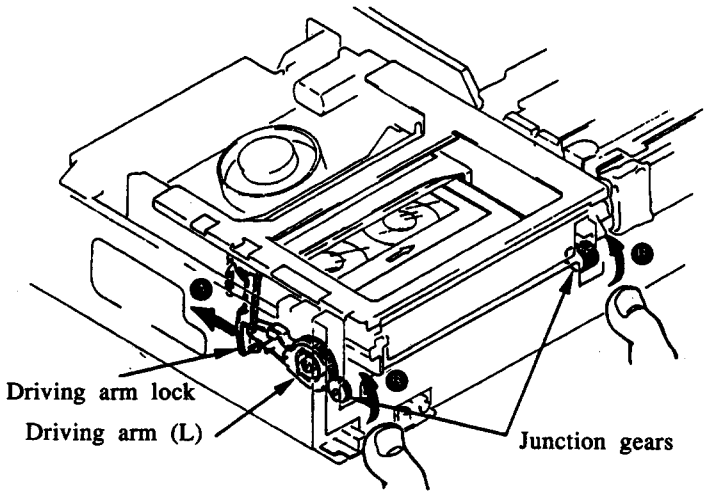
1-2. HOW TO REMOVE CASSETTE WHEN FAILED WITH CASSETTE STILL IN

① If the tape cannot be taken out while being wrapped onto the drum, remove the CM-13 board from the lower side of the mechanical unit, rotate the capstan motor wheel in any direction to turn the reel in the S or T side and house the tape. After completion of housing, operate ②.

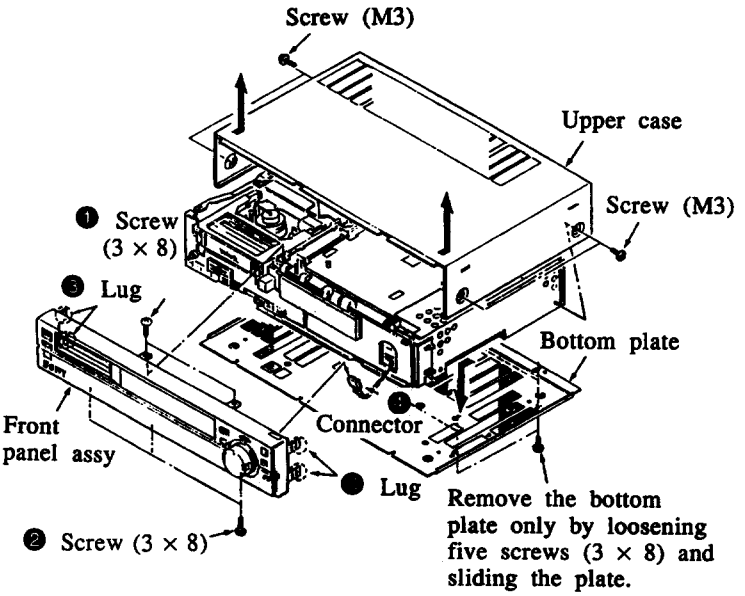
② When the tape is housed in the cassette half and cannot be taken out:

1) Remove the front panel and remove the assy of the L frame and driving arm (L) equipped in the left side of the cassette control unit, in the direction of the arrow ⓐ.

2) Rotate the junction gears in the direction of the arrow ⓑ with your both thumbs.



1-3. REPLACING of OUTER FITTINGS

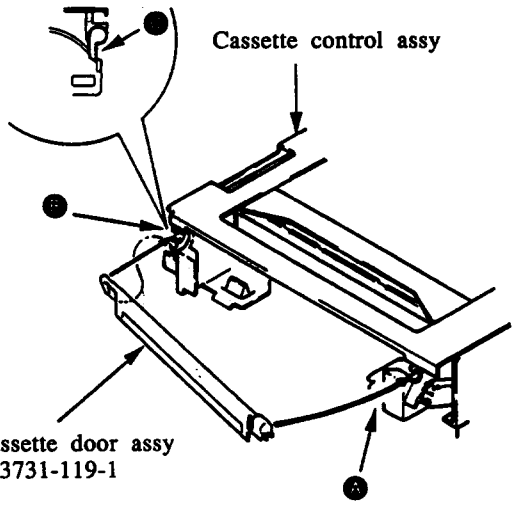


1-4. REPLACING of CASSETTE DOOR ASSY

1) Remove the front panel.

2) First remove Part ❶ towards you and then remove Part ❷.

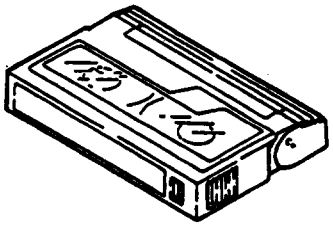
3) For mounting, first engage the lug of Part ❸ and then Part ❹. Mount Part ❸ so that the door can hang substantially vertically.



1-5. HOW TO CLEAN VIDEO HEAD AND RUNNING SYSTEM

Method 1 Cleaning with cleaning tape

- Use the cleaning cassette V8-25CLN. (Before using it, be careful to read the manual attached to the cleaning cassette.)

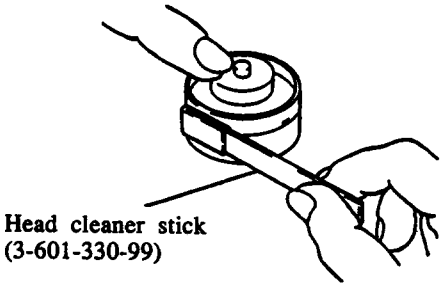


Method 2 Cleaning with cleaning liquid

① Remove the upper case of the video deck.

② Coat the cleaning liquid onto the head cleaner stick (Ref No. 3-601-330-99).

③ Referring to the right, clean the video head by lightly attaching the head cleaner stick while slowly rotating the rubber part of the upper rotation drum.



(Cleaning of running system)

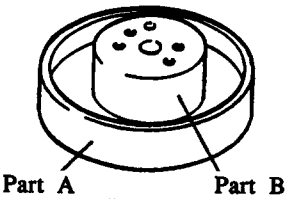
① Coat the cleaning liquid onto the head cleaner stick.

② Clean each guide and pinch roller coming in direct contact with the tape, using the head cleaner.

1-6. REPLACING of UPPER ROTATION DRUM

Method 3 Precautions

- Be extremely careful to handling the video head and the terminal.
- Referring to Fig. 1, don't touch the side surface (Part A) directly with your finger tips but hold the upper part (Part B) to take the upper rotation drum.

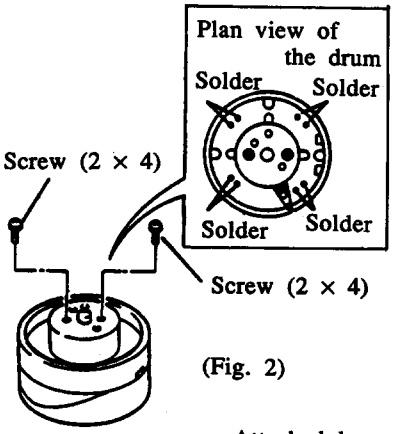


(Fig. 1)

Removing of upper rotation drum

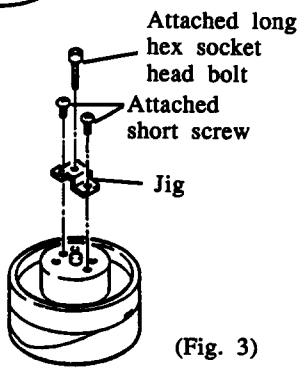
① Referring to Fig. 2, remove 2 short screws (2 × 4).

② Referring to Fig. 2, completely remove the soldering at 8 places on the board of the upper rotation drum.



(Fig. 2)

③ Referring to Fig. 3, fix the repairing jig (packed in the upper rotation drum) using 2 short screws attached to the jig and screw in the attached long screw rod. Thereby, the upper rotation drum is removed.

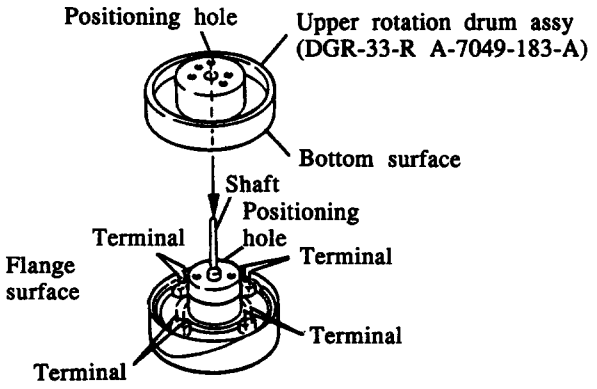


(Fig. 3)

Mounting of new upper rotation drum

① Referring to Fig. 4, clean the flange surface and the bottom surface of the new upper rotation drum.

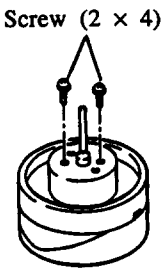
② Referring to Fig. 4, insert the shaft attached to the jig into the positioning hole of the lower drum, insert the shaft into the positioning hole of the new upper rotation drum and softly set the upper rotation drum.



(Fig. 4)

③ Lightly push the upper rotation drum manually with the shaft still inserted in the positioning hole. However, if it cannot be inserted completely, alternately tighten 2 long screws (2 × 5) referring to Fig. 5 to fix the upper rotation drum.

④ Remove the shaft already inserted before. If removing of the shaft is sluggish at that time, repeat operations from ②.



(Fig. 5)

⑤ Referring to Fig. 2, solder 8 places on the board of the upper rotation drum and 8 terminals.

⑥ After completion of replacing the upper rotation drum, clean the video head and the running system using the head cleaner stick referring to "Method 2 Cleaning of Video Head and Running System."

SECTION 2
GENERAL

This section is extracted from instruction manual.

Features

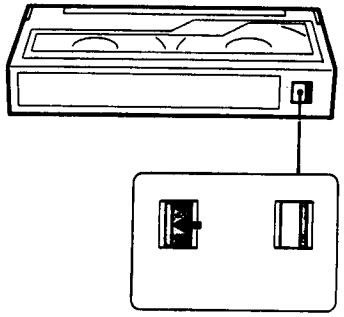
- **PCM audio recording system**
  This feature allows you to take advantage of the latest technology in high-grade audio systems.
- **Hi-Fi stereo recording and playback**
  You can enjoy dynamic Hi-Fi stereo sound by connecting your audio system to this VCR.
- **EDIT SHUTTLE for easy editing**
  You can search for a desired editing point quickly by turning the EDIT SHUTTLE control clockwise or counterclockwise.
- **Useful tape counter**
  The tape counter clearly indicates the number of hours, minutes and seconds that have elapsed during recording or playback operations.
- **Easy editing with a Sony 8mm Camcorder**
  The LINE IN AUDIO/VIDEO and DC OUT jacks on the front panel allow for easy connection of the Sony 8mm Camcorder. The DC OUT (7.5V, 1.6A) jack supplies power for the camcorder so that it can easily be used to perform editing.
- **Control L (LANC) jack**
  When using this jack to connect another video peripheral such as a VCR, tape transportation for the other peripheral can easily be controlled on this unit. Furthermore, you can control both devices simultaneously for a bilateral synchronized editing.
- **REC LEVEL control for audio dubbing**
  This control knob is used to adjust the audio level for each scene when audio dubbing.
- **Remote Commander with LCD**
  You can preset this VCR to show or record programs (timer setting) automatically using the Remote Commander with LCD. Almost all operations can be done by using this device.
- **Six event timer**
  Each month up to six preselected programs can be set for recording with this timer.

This unit uses 8mm video format cassettes.

It records in the SP mode (approximately 1.43 cm/second) and the LP mode (approximately 0.72 cm/second) and can play back in the SP mode and the LP mode.

This unit is equipped with PCM (digital audio) recording/playback functions.

Cassette Care



To prevent Accidental Erasure

Slide out the tab on the cassette so that the red color appears.
To re-record on the cassette, slide the tab back.

Tape Speed

The LP mode is twice as long as the SP mode. For better picture, recording in the SP mode is recommended.
During playback, the mode in which the tape was recorded is selected automatically.

Cassette used	Tape speed	
	SP	LP
P6-15	15 min.	30 min.
P6-30	30 min.	1 h.
P6-60	1 h.	2 h.
P6-90	1 h.30 min.	3 h.
P6-120	2 h.	4 h.

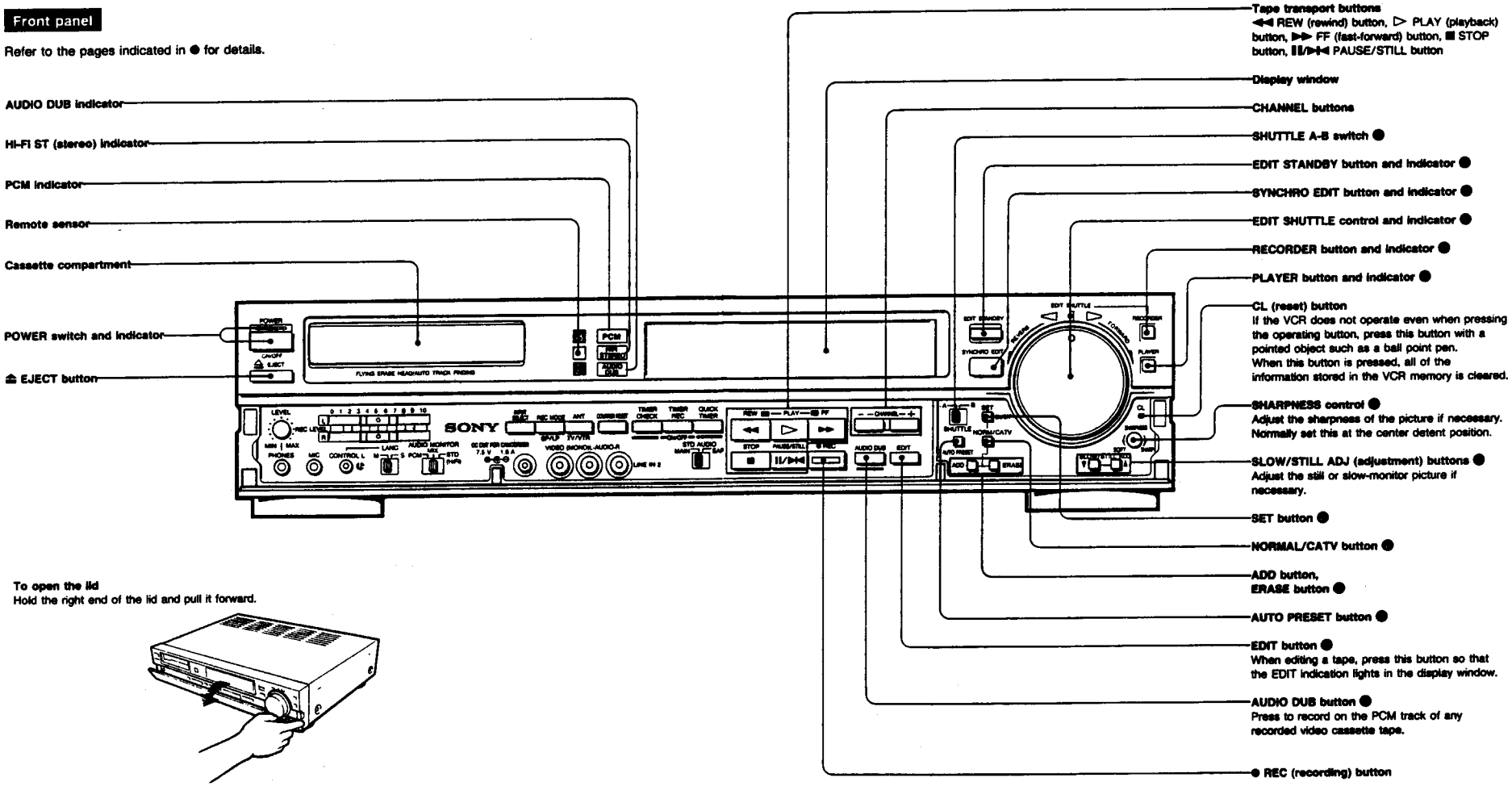
Notes

- Always insert the cassette in the correct direction.
- Never insert anything in the small holes on the rear of the cassette.
- Store cassettes in their cases and keep them in an upright position to prevent intrusion of dust and uneven winding.
- To record from the beginning of the tape, run the video camera recorder for about 15 seconds at the beginning of a cassette before recording. It will avoid missing the starting point during playback on a video cassette recorder.
- When the VCR is not in use, remove the cassette.

Location and Function of Parts Controls

Front panel

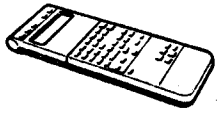
Refer to the pages indicated in ● for details.


AUDIO DUB indicator
HI-FI ST (stereo) indicator
PCM indicator
Remote sensor
Cassette compartment
POWER switch and indicator
⏏ EJECT button
Tape transport buttons
◀◀ REW (rewind) button, ▷ PLAY (playback) button, ▶▶ FF (fast-forward) button, ■ STOP button, ❚❚/▶❙◀ PAUSE/STILL button
Display window
CHANNEL buttons
SHUTTLE A-B switch ●
EDIT STANDBY button and indicator ●
SYNCHRO EDIT button and indicator ●
EDIT SHUTTLE control and indicator ●
RECORDER button and indicator ●
PLAYER button and indicator ●
CL (reset) button
If the VCR does not operate even when pressing the operating button, press this button with a pointed object such as a ball point pen.
When this button is pressed, all of the information stored in the VCR memory is cleared.
SHARPNESS control ●
Adjust the sharpness of the picture if necessary.
Normally set this at the center detent position.
SLOW/STILL ADJ (adjustment) buttons ●
Adjust the still or slow-monitor picture if necessary.
SET button ●
NORMAL/CATV button ●
ADD button,
ERASE button ●
AUTO PRESET button ●
EDIT button ●
When editing a tape, press this button so that the EDIT indication lights in the display window.
AUDIO DUB button ●
Press to record on the PCM track of any recorded video cassette tape.
● REC (recording) button

To open the lid
Hold the right end of the lid and pull it forward.

Supplied accessories

Remote Commander RMT-455 (1)

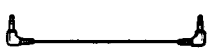


Audio connecting cord (1) (phono 2 ↔ phono 2)

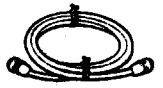
Video connecting cord (1) (phono 1 ↔ phono 1)

Size AA (R6) batteries (2)

LANC cable (1)



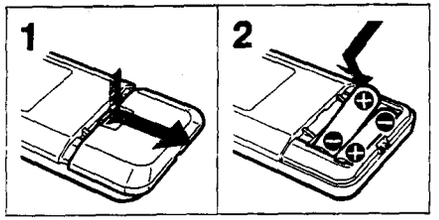
Antenna cable with F-connectors (1)

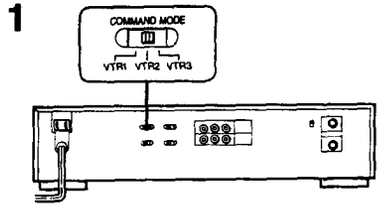


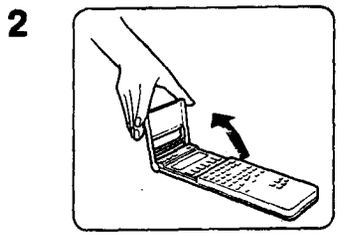
External antenna connector (1)

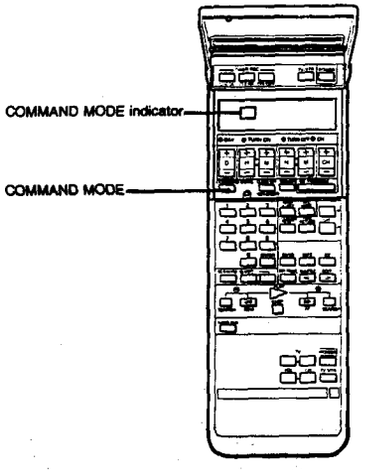
DC in cord (1)

Preparing the Remote Commander









Battery Insertion

1 **Slide and remove the cover.**

2 **Insert two R6 (size AA) batteries with the correct polarity.**

3 **Close the cover.**
The clock on the Remote Commander will read "–:–".
Set the date and clock referring to "Setting the Clock".

Setting the Remote Commander to control your VCR

This Remote Commander can be used to control three different types of Sony VCRs. The Remote Commander identifies each VCR by its command mode setting.

Setting the command mode on this VCR

1 **Set the COMMAND MODE selector on the rear panel of the VCR to the desired position, VTR1, VTR2 or VTR3. Set normally to VTR2.**

2 **Press the COMMAND MODE button on the Remote Commander to display the same position, which has been set on the VCR, in the LCD. Then the VCR can be operated with the Remote Commander.**

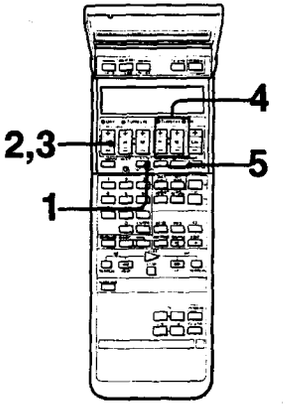
Remotely controlling other Sony VCRs

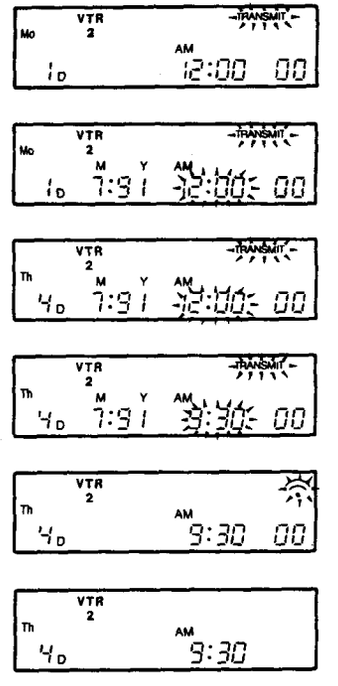
- Controlling another VCR equipped with the command mode selector
  Set different command modes for this VCR (VTR2, for instance) and the other VCR (VTR1). Select the identical command mode set on each VCR on the Remote Commander. For instance, select VTR1 on the Remote Commander to control the other VCR and VTR2 to control this VCR.
- Controlling another VCR without a command mode selector
  Change the setting on the Remote Commander according to each type of VCR as follows:
  VTR1: Sony Betamax Ⓑ VCRs
  VTR2: Sony 8mm VCRs (this VCR)
  VTR3: Sony VHS VCRs

Note on batteries

- On battery life
  Under normal operation, batteries will last for about 6 months. When the batteries are exhausted, the remote function will not be operated when the buttons on the Remote Commander are pressed. Replace all the batteries with new ones.
- Insert batteries correctly according to their polarities.
- Do not use a new battery and an old one together. Batteries of different types also should not be used simultaneously.
- If the Remote Commander is not to be used for a long time, remove the batteries to avoid possible damage from battery leakage.

Setting the Clock





Set the date and time (clock) on the Remote Commander. Then transmit it to the VCR.

The time and date between the years 1990 and 2005 can be set.

Operation

Example: To set to 9:30 A.M. Thursday, July 4, 1991.

1 **Open the cover and press the CLOCK SET button.**

2 **Press the D+ (day) button until "7 M 91 Y" is displayed.**
The day will be advanced slowly up to 30 (31) days ahead and then the month will be advanced. When the number of the desired month has appeared, release your finger from the button.

3 **Press the + side or – side of the D (day) button until 4 D is displayed.**
The day of the week appears automatically.

4 **Press the H (hour) and M (minute) buttons under ③ TURN OFF to set to 9:30 A.M.**

5 **Point the Remote Commander at the VCR and press TRANSMIT.**
A beep sound confirms that the date and clock setting is registered in the VCR as well.
The clock on the VCR will start counting and displaying the seconds in the LCD.

6 **Check the display window on the unit and close the cover.**

When "AM 12:00" is blinking on the unit
If the power is interrupted for more than one hour, "AM 12:00" will blink in the display when the power is restored. You will have to reset the date and clock again.

When a short beep sounds repeatedly
The VCR is in the timer recording or quick timer recording mode and the setting cannot be transmitted.

When the batteries are replaced
Reset the clock correctly.

When the clock on the Remote Commander is correct but the one on the unit is incorrect

- Open the upper cover of the Remote Commander and press the CLOCK SET button.
  The correct time is displayed in LCD.
- Point the Remote Commander to the unit and press the TRANSMIT button.
  The present time is correctly transmitted in hours, minutes and seconds.

Front panel

REC MODE SP/LP (recording mode) button
This selects the recording speed, SP or LP.
The recording time of any given cassette in the LP mode is 2 times that in the SP mode.
The playback speed is automatically set regardless of the setting of this selector.

INPUT SELECT button
Press to display the desired input signal indication in the window.
TUNER: To record TV programs
LINE: *To record video/audio signals from the LINE IN 1 or 2 VIDEO/AUDIO jacks or to dub only audio signals from LINE IN AUDIO or MIC jack.*

REC LEVEL controls
Use to adjust the recording level.
When dubbing the audio signals, use to adjust the input level from the LINE IN AUDIO.

PHONES jack and LEVEL control (stereo minijack)
Connect stereo headphones.
The volume can be adjusted with the LEVEL control.

MIC (microphone) jack
To record from this jack, display "LINE" and "L1" or "L2" by pressing the INPUT SELECT button.

CONTROL L (LANC) jack (stereo mini-minijack)

LANC switch
M: Controls other peripherals with this VCR.
S: Controls this VCR with other peripherals or VCR.

About the L
L means the LANC connector.
LANC stands for Local Application Control Bus System. The LANC connector is used for controlling the tape transport of video equipment and peripherals connected to it. This connector has the same function as the connectors indicated as CONTROL L or REMOTE.

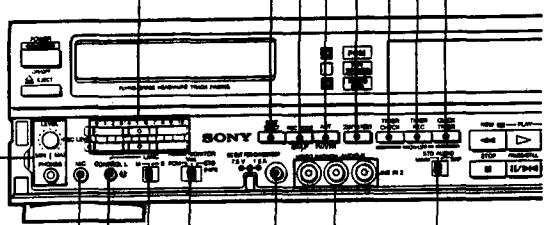
ANT TV/VTR button
Press to view the program selected on the recorder.
The VTR indicator appears in the display window (VTR mode).
To view a TV program while recording another, press this button again.
The VTR indicator disappears (TV mode).

COUNTER RESET button
Press to reset the tape counter to zero.

TIMER CHECK button
Press to check the contents of the timer presettings.

TIMER REC ON/OFF button

QUICK TIMER button



STD (standard) AUDIO selector
Select either MAIN (main sound) or SAP (sub sound).

LINE IN (input) 2 VIDEO/AUDIO jacks (phono jack)

DC OUT FOR CAMCORDER
Use supplied DC cable for COMCORDER connection.

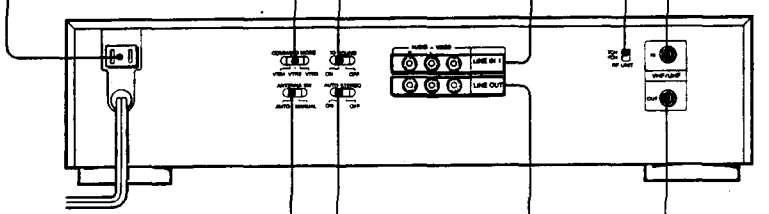
AUDIO MONITOR selector
During playback or recording, set to the appropriate position to monitor the desired sound.
PCM: to play back the sound on the PCM track. When nothing is recorded on the PCM track, the recorded sound on the standard track is played back regardless of the position of this selector.
MIX: to play back the sound on the PCM and standard tracks simultaneously.
STD: to play back the sound on the standard track.

Rear panel

×2 SOUND switch
To hear the sound in double speed playback, set the ×2 SOUND switch on the VCR to ON. The sound is also played back in double speed. If the sound is unnecessary, set the switch to OFF.

COMMAND MODE selector
When operating this VCR with the Remote Commander, select the same position as this on the Remote Commander.

AC OUTLET (unswitched)
Supplies AC power to the connected video or audio equipment with power consumption less than 400W.



ANTENNA SW selector
When connecting to a TV with video/audio inputs, set to MANUAL. When connecting to a TV without them, set to AUTO.

AUTO STEREO switch
Usually set it to ON.
ON: Automatically set to stereo or monaural broadcast.
OFF: Always in monaural mode even if being set to stereo broadcast.

LINE IN (input) 1 VIDEO/AUDIO jacks (phono jack)
Connect to the video and audio outputs of a TV, VCR, CD player, etc.

RF UNIT channel select switch
Selects the channel for the VCR program converted into VHF signals and output from the VHF/UHF OUT connector.
Set the switch to 3CH or 4CH, whichever is not active in your area.

VHF/UHF IN (input) terminal
Connect the antenna cable.

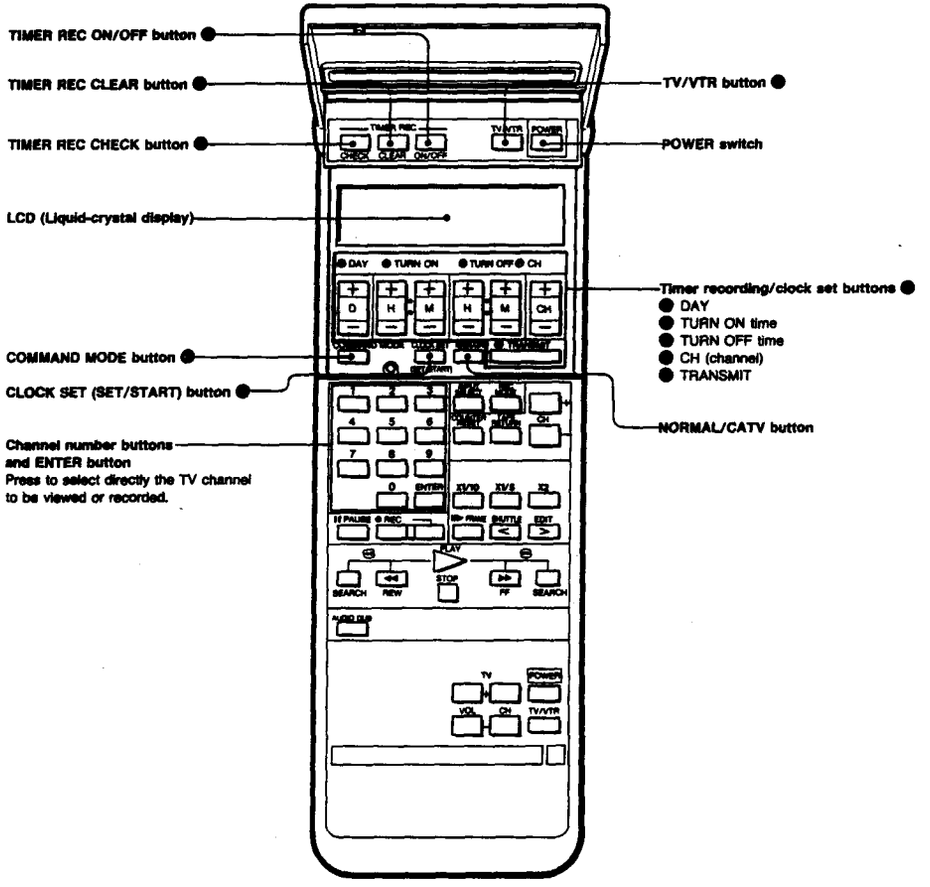
VHF/UHF OUT (output) terminal
Connect to the VHF/UHF antenna terminal of the TV.

LINE OUT (output) VIDEO/AUDIO jacks (phono jack)
Connect to the video and audio inputs of a TV, VCR, amplifier, etc.

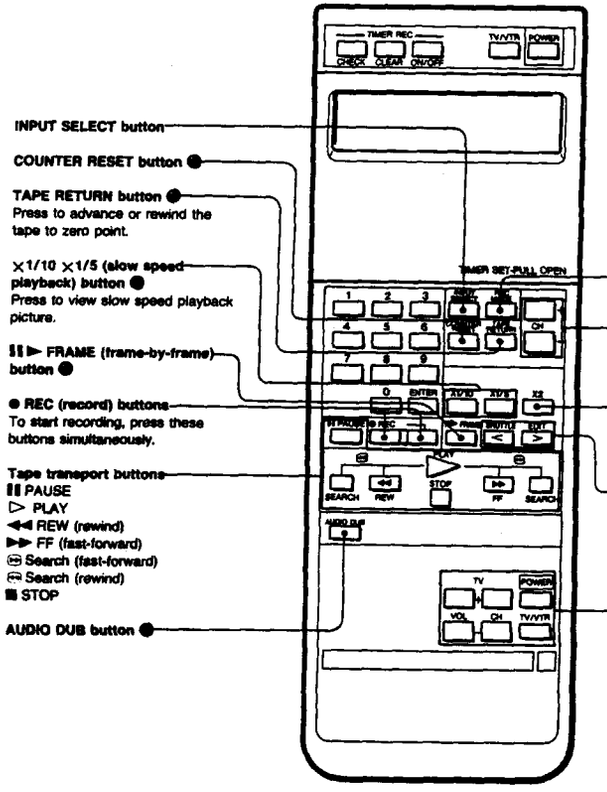
Remote Commander RMT-455

Almost all operations can be done with this Remote Commander.
Buttons on this Remote Commander have the same functions as those on the VCR.

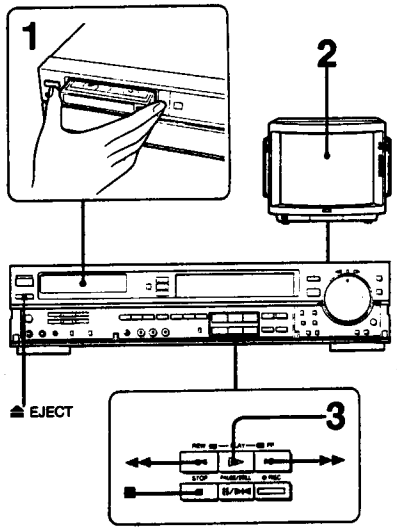
- Operate the Remote Commander keeping the upper cover closed except when adjusting the Clock Setting or Timer Setting.
- INPUT SELECT button and REC MODE select button
  When the upper cover is closed, these are used for setting the input select and the recording mode at present respectively.
  When opened, the input select and the recording mode to be preset are selected respectively by these buttons.

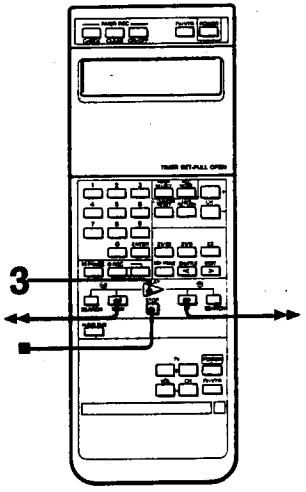


Remote Commander Precautions
Do not let sunlight or light from a powerful artificial light source fall directly on the Remote Commander sensor on the front panel as it may interfere with operations or damage the sensor.


INPUT SELECT button
COUNTER RESET button
TAPE RETURN button
Press to advance or rewind the tape to zero point.
×1/10 ×1/5 (slow speed playback) button
Press to view slow speed playback picture.
FRAME (frame-by-frame) button
REC (record) buttons
To start recording, press these buttons simultaneously.
Tape transport buttons
PAUSE
PLAY
REW (rewind)
FF (fast-forward)
Search (fast-forward)
Search (rewind)
STOP
AUDIO DUB button
REC MODE select button
CHANNEL buttons
×2 (double speed playback) button
Press to view double speed playback picture.
SHUTTLE EDIT </> buttons
TV operation buttons
Can be used to control Sony TV sets bearing the mark.
TV POWER button
TV/VTR button
Press to switch to a video recorder connected to the video/audio inputs of the TV set.
(This function is available only with certain TV models.)
CH (channel) +/– buttons
Press to select the TV channel.
VOL (volume) +/– buttons
Press to control the TV volume.

Playback





Playback can be controlled with the identicaly marked buttons on both the unit and the Remote Commander.
For details on connecting, see page 39.

Playing a Tape

1 Insert the cassette slowly into the unit. The power turns on automatically.

2 Turn on the TV and select the channel, or select the input for the VCR. When using the TV without the video input, select 3CH or 4CH.

3 Press the ▷ PLAY button. ▷ appears in the display window and playback starts.

Caution
Beware that children do not insert their fingers into the cassette compartment. Doing this may cause injury.

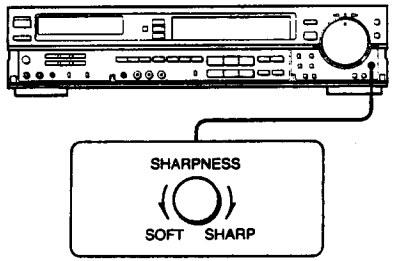
To stop playback
Press ■.

To rewind the tape
Press ◀◀. ◁◁ appears in the display window on the unit.

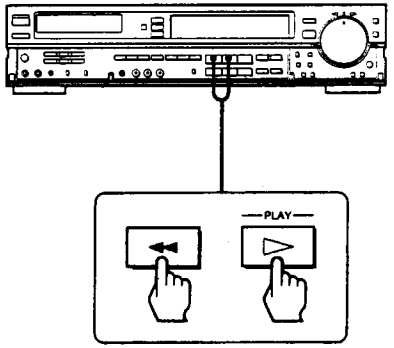
To advance the tape rapidly
Press ▶▶. ▷▷ appears in the display window on the unit.

To eject the cassette
Press ⏏ EJECT on the unit. Pressing the ⏏ EJECT button when the VCR is turned off will turn the unit on, eject the cassette, and then turn it off again.
⏏ EJECT does not function during recording or recording pause mode.

Note
When the end of the tape is reached during playback, the VCR automatically rewinds the cassette.



Picture adjustment
Turn the SHARPNESS control toward SOFT or SHARP. Normally set to the center of the control.



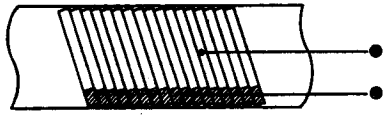
Playing back a tape from the beginning after rewinding – Auto Play

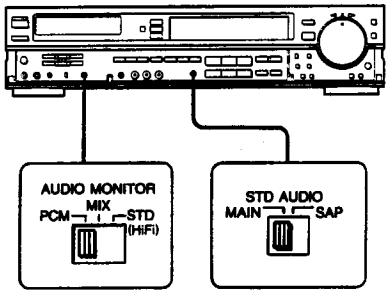
While pressing the ◀◀ REW button, press the ▷ PLAY button. The "AUTO" indication will be displayed in the display window on the unit.

To index through a tape
Press the COUNTER RESET button at the beginning of a tape to set the counter to "0H00M00S". A convenient way to search a desired scene later is to make a note of the counter reading at that point.
(Refer to page 19.)

When this VCR is connected to the antenna input (VHF/UHF) terminal and the picture does not appear on the TV screen, possible causes are:
- If the ANTENNA SW is set to "MANUAL", the played back picture cannot be displayed.
  Set the ANTENNA SW to "AUTO".
- Press the TV/VTR button on the VCR or the Commander to display "VTR"

When a blank tape is played back,
The picture will not appear and the tape counter will not function.





Selecting the Monitor Sound

Enlarged diagram of tape
● Standard track
● PCM track

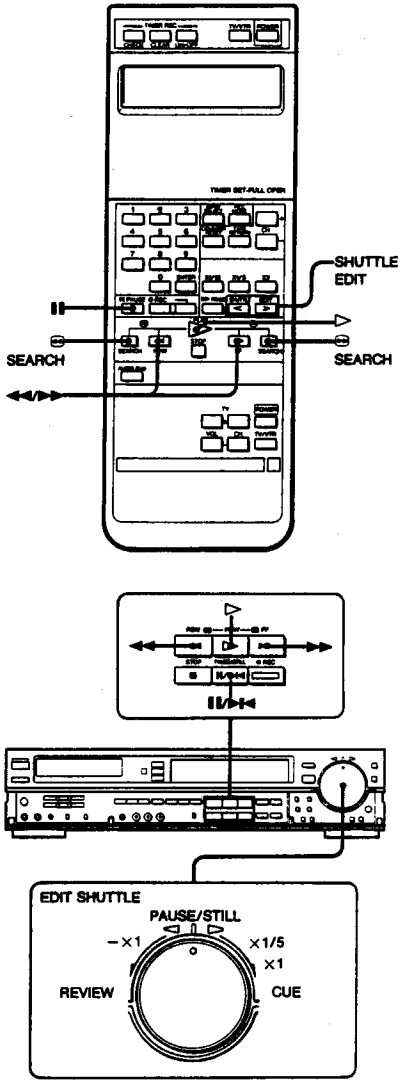
Kind of the tape	Track to be played back	Position of the AUDIO MONITOR selector
Stereo	PCM	PCM
Multichannel TV sound broadcasts*	PCM and/or standard	To monitor Main: PCM (when the main sound is recorded on the standard track, the sound can be played back also by setting the AUDIO MONITOR selector to STD.) To monitor SAP: STD (when SAP sound is recorded on the standard track.) To monitor both: MIX
Audio dubbed	PCM and standard	PCM (Dubbed sound) MIX (Both sounds) STD (Standard)
Tapes recorded on VCR without PCM function	Standard	PCM (The sound recorded on the standard track is selected automatically.)

* See page 21 for recording SAP broadcast.

When no sound during playback or the PCM indicator blinks:
When a tape which has been recorded on a video camera recorder or a VCR without the PCM function is played back on this unit, the sound may not be heard or be heard only intermittently.
In such a case, select STD on the AUDIO MONITOR switch. The PCM indicator may keep blinking but it will not affect the sound.

When a TV without VIDEO/AUDIO input is connected:
To monitor the playback sound in stereo mode, connect a stereo system additionally.

When no recording is on the PCM track:
If the AUDIO MONITOR switch is selected to PCM or MIX, the standard track will be played automatically.



Playing back in Various Modes

Still picture
Press the II ▶I◀ PAUSE/STILL button on the unit or II PAUSE button on the Commander during playback.
The II will appear in the display window.
To resume normal playback, press the ▷ PLAY button, or the II ▶I◀ PAUSE/STILL button or II PAUSE button on the Commander again.

When the pause mode lasts for more than approximately 7 minutes, it will be automatically released and the VCR will resume the playback mode.

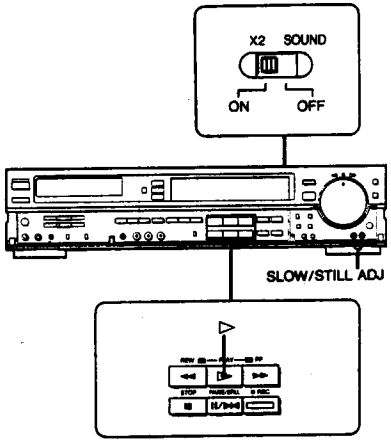
Locked picture search (Commander only)
Press the SEARCH ⊖ or ⊕ button during playback or in still picture mode. To resume normal playback, press the ▷ PLAY button.

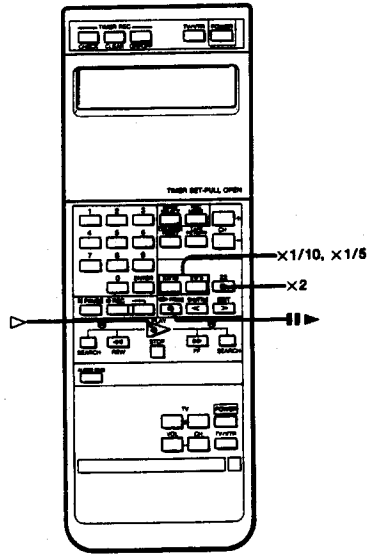
Picture search
Keep pressing the ◀◀ REW or ▶▶ FF button during playback or in still picture mode. Release the button for normal playback.

FR picture search
Press ▶▶ during fast-forward or ◀◀ during rewind mode. The fast-forward or rewind mode picture can be viewed while the button is pressed.

Using the EDIT SHUTTLE (Main unit only)
Various playback modes can be selected by holding the EDIT SHUTTLE in the position illustrated. Turn it clockwise for forward direction and counterclockwise for reverse direction. Releasing it will place the picture in the pause/still mode. To resume normal playback, press II or ▷.

Using the SHUTTLE EDIT (Commander only)
Rewind playback (<) or normal playback (>) can be done by holding down the < or > button on the Commander in still picture mode.
Releasing it returns the VCR to still picture mode.





Double speed playback (Commander only)
To view the double speed playback picture, press the ×2 button during playback or still picture mode. If the ×2 SOUND switch on the rear panel of the unit is set to ON, the sound is also played in double speed. If OFF, no sound is heard.
To resume normal playback, press the ▷ PLAY button.

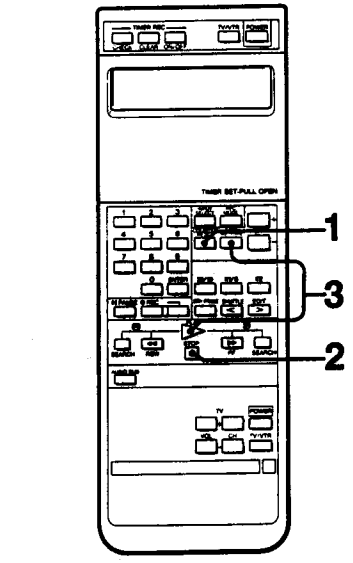
Slow speed playback (Commander only)
Press the ×1/10 or ×1/5 button during playback or in still picture mode.
To resume normal playback, press the ▷ PLAY button.

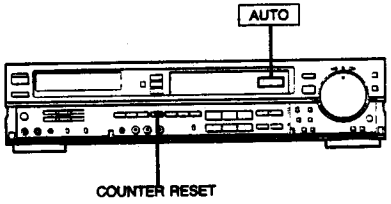
Frame-by-frame playback (Commander only)
Press the II► FRAME button in still picture mode.
To resume normal playback, press the ▷ PLAY button.

If the picture shakes during double speed playback or still picture:
Press the SLOW/STILL ADJ buttons to adjust to the least shaking point.

If noise bars appear on the screen during slow playback:
Press the SLOW/STILL ADJ buttons to squeeze them out. Adjust this for each playback speed (SP/LP).

Notes
- Noise bars will appear and the sound will be muted in the high-speed playback mode.
- Horizontal bars appear at the top and bottom on the screen and sounds are not heared during −×1 playback.
- When a cassette recorded in SP mode is played back in still picture or picture search mode, the picture may appear in black and white or shake depending on the TV being used.
- When a cassette is recorded in SP mode, noise bars will be wider than those on LP-recorded cassettes.





Using the Tape Counter

The COUNTER RESET buttons on the unit and on the Remote Commander have the same function.
Press the COUNTER RESET button at the beginning of the tape so that the counter shows "0H00M00S". By noting the counter reading at a particular point, you can easily find that point later by referring to the tape counter.

To rewind the tape to a particular point (auto play)

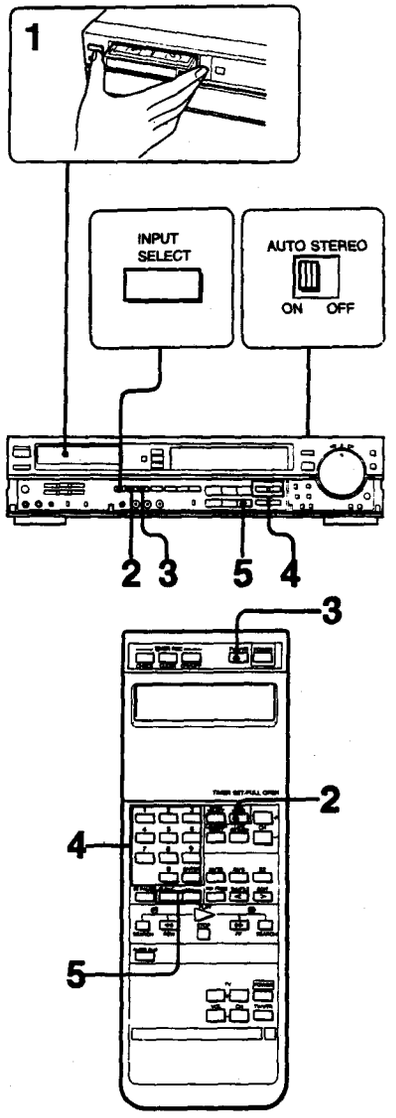
1 **During playback or recording, press the COUNTER RESET button at the point to be located later. The counter is reset to "0H00M00S".**

2 **When playback or recording is finished, press the ■ STOP button to stop the tape.**

3 **Press the TAPE RETURN and ▷ PLAY buttons. The "AUTO" indication will be displayed. The tape is rewound or advanced to the approximate "0H00M00S" point and played back automatically.**

Notes
- When only the TAPE RETURN button is pressed, the tape will stop at the approximate "0H00M00S" point (tape return).
- The TAPE RETURN functions only when the counter reading is beyond ±1 minutes.
- The counter reading and the point of the tape may not correspond exactly. Use the counter as a guide.
- The counter does not operate for a blank, unrecorded portion of a tape.
- There will be a time lag of several seconds on the counter reading after repeated fast-forward and rewind operations.
- There will be also a time lag of several seconds when the tape recorded in LP and SP modes mixed or the tape having a blank portion between the recorded portions is played back.

Recording a TV Program



Before recording
- Turn on the TV and select the channel for the unit or select the input for the VCR*.
- Press the INPUT SELECT button so that the TUNER indication appears.
- Set the AUTO STEREO switch to ON.

* If your TV/monitor is equipped with video/audio inputs, select the correct input on your TV/monitor.

Operation

1 **Insert a cassette.**
The power turns on automatically.

2 **To select the recording mode, SP or LP. Press the REC MODE button.**

3 **Select VTR on the ANT TV/VTR button when the VCR is connected to TV without video/audio input terminals.**
The "VTR" indication will be displayed.

4 **Select the channel to be recorded.**

5 **Start recording by pressing the ●REC button(s). To do this on the Commander, press both ●REC buttons simultaneously.**

To stop recording
Press the ■ STOP button.

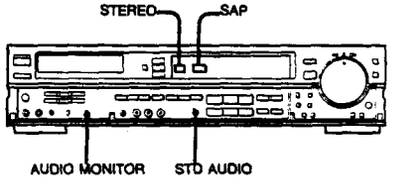
To stop recording for a moment:
Press the ❚❚/▷▷|◁◁ PAUSE/STILL or ❚❚ PAUSE button on the Commander.
To resume recording, press the button once again. (To protect the tape and video heads, the pause mode is cancelled after about 7 minutes and the unit will enter the stop mode automatically.)

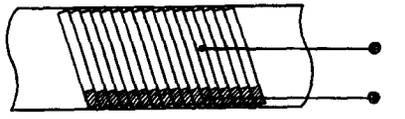
When the end of the tape is reached by recording, the VCR automatically rewind the tape to the beginning and enters the stop mode. The power remains on.

If the tape is ejected when the ●REC buttons are pressed
The tab on the cassette is slid out. Slide the tab in, or use a new cassette.

Viewing One TV Program While Recording Another

Press the ANT TV/VTR button so that the VTR indication disappears. Select the channel you want to view on the TV.
If your TV is equipped with a TV/VTR INPUT selector, simply select TV and then the desired channel on the TV.





Recording Stereo or SAP Broadcasts

When receiving a stereo program,
The "STEREO" indication will be displayed in the display window.

When recording SAP broadcasts

1 **Choose the sound to be recorded on the standard track by using the STD AUDIO selector.**
If you choose SAP, the SAP indication will appear in the display window.

2 **Choose the sound to be monitored by the AUDIO MONITOR selector.**
PCM: To monitor the main sound (in stereo or monaural)
STD: To monitor the sound selected by the STD AUDIO selector.
MIX: To monitor both of the above sounds.

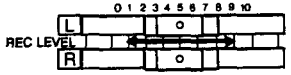
Note
If the SAP mode is selected and there is no SAP broadcast, no sound will be heard from the speakers and no sound is recorded on the standard track. Therefore, when you play back this tape on an 8mm VCR without a PCM function, no sound will be heard. The SAP broadcast is always transmitted with the MAIN broadcast.

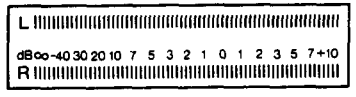
Recording is made as follows:

● **Standard track**
Video/audio signals of the TV program and the main or SAP sound of a SAP broadcast are recorded here.
Recorded sounds are monaural.

● **PCM track**
Audio signals from the connected equipment or from TV are recorded in digital PCM sound.
Sound can either be in monaural (when sounds for left and right channel are the same) or in stereo (each sound for left and right channels). Only the main sound signals will be recorded.

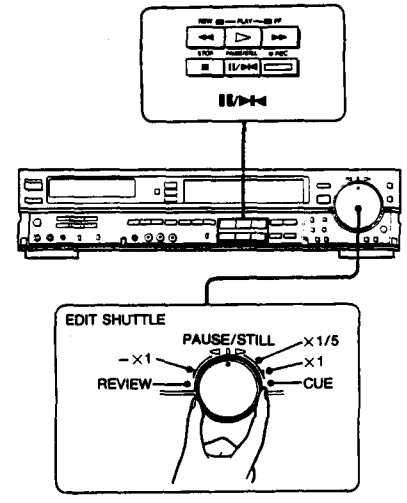
If the received stereo signals are noisy
Set the AUTO STEREO switch to OFF.
The sound will be monaural.

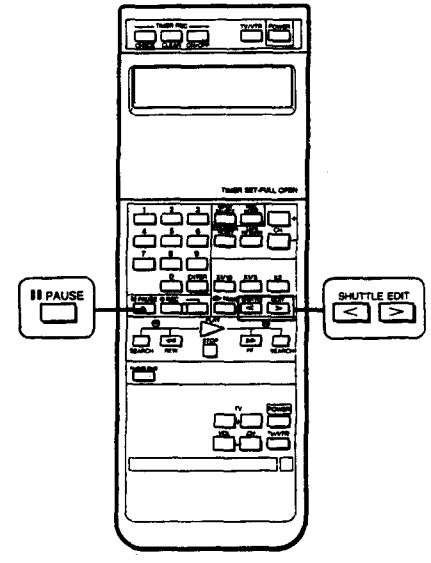




Adjusting the Recording Level

- Recording from the tuner on the unit
  To obtain the best recorded sound, set the REC LEVEL controls at 5 position.
- Recording from an external sound source
  Adjust the level on the REC LEVEL controls according to the source.
- Appropriate recording level
  Medium or lower frequency signals from a source (e.g.vocal)
  Adjust so that the element at the 0 dB level lights at the highest signal level.
  Mediun or higher frequency signals from a source (e.g. trumpet, treble sound of violin)
  Adjust so that the element at the −1 to −3 dB level lights at the highest signal level.





Cutting Out a Scene by Recording Over It

Overview

Using the recording pause mode, you can stop recording when an unwanted scene appears and then resume recording smoothly.
To easily reach an unwanted scene by rewinding and/or advancing the tape, use the SHUTTLE EDIT buttons on the Commander or the EDIT SHUTTLE on the unit. The unit will then enter the recording pause mode and allow you to resume recording smoothly.

Operation

1 **While recording TV broadcast, press II PAUSE on the Commander or II/▶I◀ PAUSE/STILL on the unit.**
The unit will enter the recording pause mode.

2 **Rewind the tape with the SHUTTLE EDIT </> buttons on the Commander or the EDIT SHUTTLE control on the unit to locate the point to resume recording.**

Using the EDIT SHUTTLE
Turn counterclockwise to search in reverse.
Turn clockwise to search in forward.
The playback speed is as indicated in the illustration.

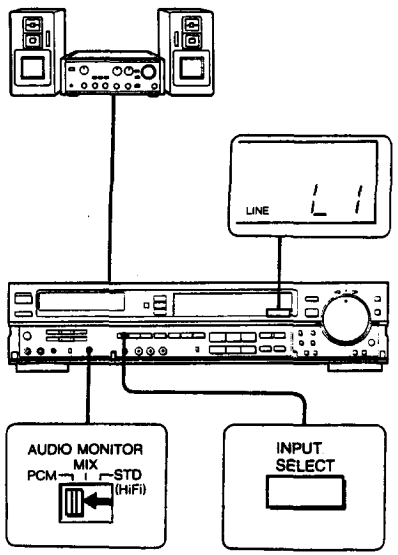
Using the SHUTTLE EDIT </>
Press < to reverse the picture (×1 speed).
Press > to advance the picture (×1 speed).

3 **Release the SHUTTLE EDIT button or the EDIT SHUTTLE control at the desired point.**
The unit enters the recording pause mode after approximately 2 seconds.

4 **Press the II PAUSE button on the Commander or the II/▶I◀ PAUSE/STILL button on the unit when you wish to resume recording.**

Note
To protect the tape and video heads, the pause mode will be automatically released after about 7 minites and the unit will enter the stop mode.

PCM Audio Recording



Only the audio signals are recorded on the PCM track.

Normally adjust the REC LEVEL control to 5 position.
To record both the video and audio signals, connect the video equipment to the LINE IN VIDEO jack. Then audio signals from the audio system are recorded on PCM track and video signals via LINE IN VIDEO are recorded on the standard track.

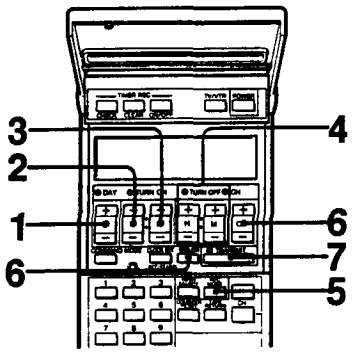
For details on connecting, see page 44.

1 **Set the AUDIO MONITOR selector to PCM.**

2 **Press the INPUT SELECT button.**
The "L1" indication will appear in the display window.

Note
When a digital audio processor that does not conform to the 8mm format standard is used, select the SP mode and press the EDIT button so that the "EDIT" indication lights.

Timer-Activated Recording



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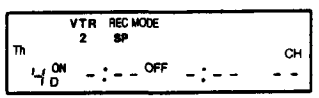
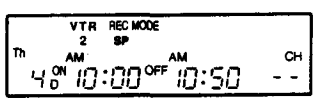


2,3

4


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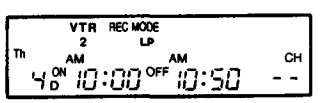

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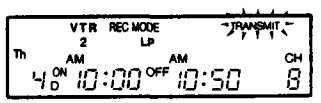
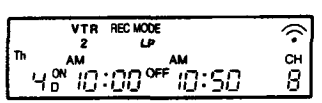
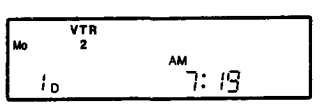


7


8


Set the program on the Commander, then transmit it to the unit.
The timer can be set to record up to six timer setting programs on certain days or every day within one month. Presetting can be done even if power is turned off or the VCR is in recording pause mode.

Su	Mo	Tu	We	Th	Fr	Sa	
		1	2	3	4	5	Today
6	7	8	9	10	11	12	
13	14	15	16	17	18	19	Possible days for recording
20	21	22	23	24	25	26	
27	28	29	30	1	2	3	
4	5	6	7	8	9	10	
11	12	13	14	15	16	17	
18	19	20					

Before timer setting
- Check that the clock on the unit is correct and that it corresponds to the clock on the Commander.
  For setting instructions, see page 7.
- Make sure the cassette is long enough to record all of the programs.
- Be sure the safety tab of the cassette has not been slid out.
- Press the INPUT SELECT button so that the TUNER indication appears.

Setting the Timer

Example: To record a program broadcast from 10:00 AM to 10:50 AM on Thursday, July 4, 1991 on program channel 8 in LP mode.

1 **Open the cover of the Commander and press D until 4 appears.**
The day of the week, Th (Thursday) is automatically set.

2 **Set the hour to start recording with ② TURN ON H.**

3 **Set the minute to start recording with ② TURN ON M.**

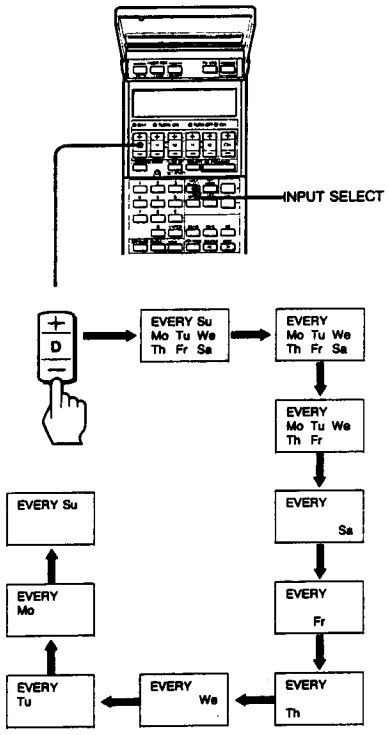
4 **Set the hour and minute to end recording with ③** TURN OFF H and M.

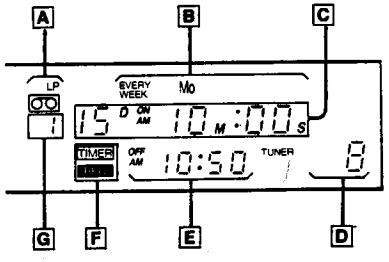
5 **Set the recording mode, SP or LP, with the REC MODE button.**

6 **Select normal or cable TV with NORMAL/CATV button then set the desired channel with the CHANNEL button.**
The "TRANSMIT" indicator blinks to indicate that all of the items are entered.

7 **Point the Commander to the VCR and press TRANSMIT.**
Transmitting should be done within five minutes.
The VCR produces beep sound and enters the recording standby mode.

8 **Close the cover of the Commander so that the present time appears on the LCD display.**
The VCR turns itself on and starts recording at the selected time, then turns off after the recording ends.





To set another program
Repeat steps 1 to 7 before 8.

To record from the equipment connected to LINE IN VIDEO/AUDIO 1 or 2 jacks
Press INPUT SELECT in step 6 on the previous page to change the indication from CH to LINE, L1 or L2. Then select as connected.

Making Daily/Weekly Recording

This VCR can be preset to record the same program each day of the week (daily recording) or the same program on a specific day of the week.

Instead of step 1 under "Operation", press D – on the Commander to change the LCD in the order shown in the illustration. When the desired recording mode is set and transmitted to the VCR, the correponding indicator lights in the display window.

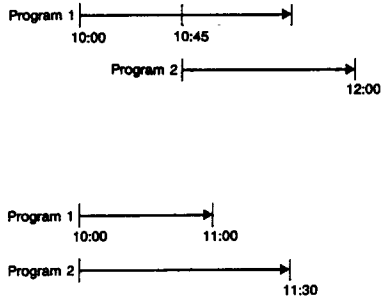
Notes
Active buttons during timer-activated recording
- TIMER CHECK button
- COUNTER RESET button
- ANT TV/VTR button (Viewing another program during recording one program is possible.)

After a preset recording is over, the numbers of presettings are moved up in turn.

Indication in the Display Window on the Unit

A few second after the transmitting, press the TIMER CHECK button then indication will appear as shown in the illustration.

A Rec mode SP/LP (Tape speed)
B A day of the week
C Starting time
D Channel to be recorded
E Ending time
F TIMER REC indication
(Turns on when program is set. Shown during the power turns off.)
G Program order number (6 timer settings available)



When the Timer Settings Overlap

If the settings for two programs overlap
The recording of program 2 will begin before the program 1 is finished.
In the illust.: (The colored portion will not be recorded.)

If the turn-on time of two programs are the same
The recording of the program having the higher program number (ex. program 1) will be made. The memory of the program having the lower number will be cleared.
In the illust.: (The colored portion will not be recorded.)

To record using the entire tape
Skip the turn-off time setting or set it to a time after the tape will reach the end.

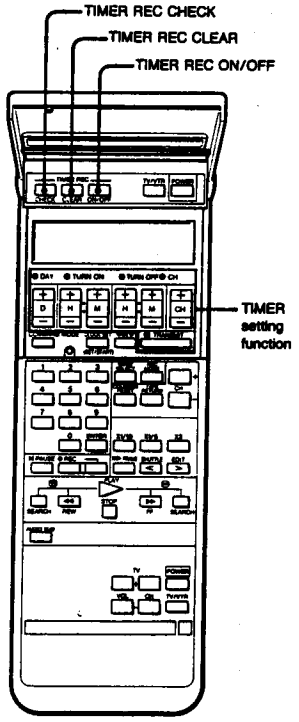
Note
If the starting time of the former setting and the ending time of the latter setting are the same, about twenty seconds of the last portion of the former will be missing.

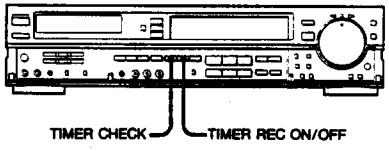
Caution
If a short beep occurs when TRANSMIT is pressed A short beep indicates that the transmission was not received by the VCR. Press TRANSMIT again before closing the cover, then check the items below.
- An illogical setting has been made.
- Timer setting can only be performed when the VCR is turned off, or in the stop, or timer recording mode.
- Six timer settings have already been made.
- The tape is at its end.
- The clock on the unit does not correspond to the one on the Commander.

When the cassette is ejected by pressing the TRANSMIT button or the TIMER REC ON/OFF button
- The opening on the cassette rear is red (closed). Slide the tab in to open, or insert a new cassette.

When the TIMER REC ON/OFF button is pressed "TIMER REC" does not appear the display window on the unit
- The cassette for recording is not inserted.
- The cassette is at its end.
- The timer setting is not set on the unit.

If a power interruption occurs
Recording will stop and power will turn off.
If the power interruption lasted for about 1 hour or less and recording time remains, recording will resume after the power comes back on.





Checking the timer setting

Press the TIMER REC CHECK button one time after another to display set programs in order.

Changing a preset timer setting

1 **Press the TIMER REC ON/OFF button to clear the TIMER REC indication.**

2 **Press the TIMER REC CHECK button to select the program number to be changed.**

3 **Set another program with the Commander then press the TRANSMIT button.**

4 **Press the TIMER REC ON/OFF button again to turn on the "TIMER REC" indicator on the unit.**

Clearing a preset timer setting

1 **Press the TIMER REC ON/OFF button to clear the TIMER REC indicator.**

2 **Press the TIMER REC CHECK button, then select the program number to be cleared.**

3 **Press the TIMER REC CLEAR button.**

4 **When other timer settings exist, press the TIMER REC ON/OFF button to turn the "TIMER REC" indicator on.**

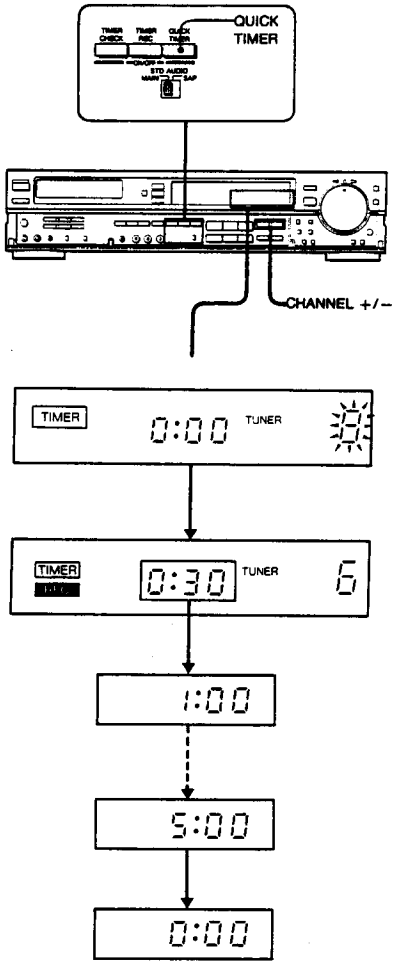
Stopping timer-activated recording in progress

Press the TIMER REC ON/OFF button.
Recording will stop.

Using the unit before timer-activated recording starts

- To start using the VCR
  Press the TIMER REC ON/OFF button to turn off the "TIMER REC" indication in the display window on the unit.
- To quit using the VCR
  Press the TIMER REC ON/OFF button to turn on the "TIMER REC" indication in the display window on the unit.

Quick Timer Recording



What is Quick Timer Recording?
With the quick timer recording function, simple and rough timer recordings can be made. The timer can be set to operate within 5 hours in units of 30 minutes.

Operation

1 **Check the following items.**
INPUT SELECT : Displays "TUNER" in the window
REC MODE SP/LP : SP or LP
REC LEVEL : Approximate standard on 5 position

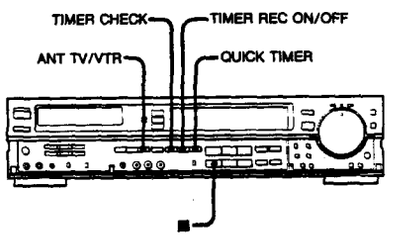
2 **If the cassette is not inserted, insert it.**

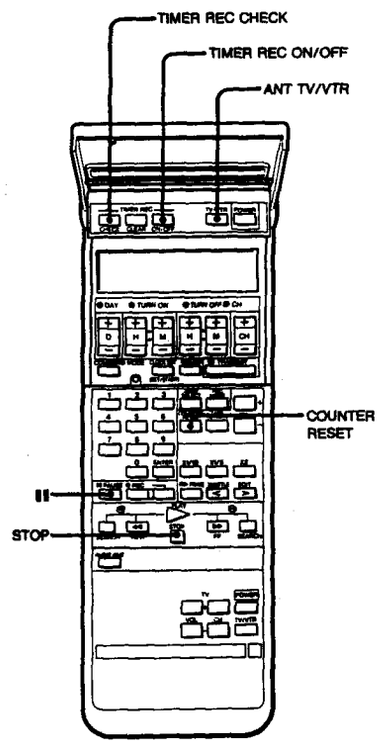
3 **Press the QUICK TIMER button**
The channel can be changed while the channel indicator is blinking (for about 25 seconds).

4 **Press the QUICK TIMER button repeatedly to select recording time.**
Each press of the button increases the preset recording time up to 5 hours in units of 30 minutes.

5 **When the TIMER COUNTER counts down to "0:00", the VCR is stopped and the power is turned off.**

During quick timer recording, the recording time can be changed by pressing the QUICK TIMER button. During recording, the time displayed will count down in units of one minute.





Function available during Quick Timer Recording

Stopping recordings in progress
Press the TIMER REC ON/OFF button.
(The ■ STOP button does not work.)

Changing recording time
Press the QUICK TIMER button

Checking the timer
Press the TIMER CHECK button. (Preset programs will be displayed in the window on the unit.)

Resuming "0H00M00S" on the counter preset program
Press the COUNTER RESET button.

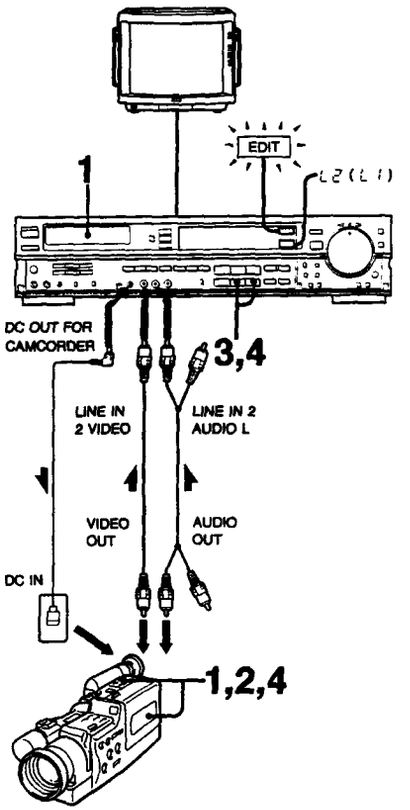
Monitoring another channel
Press the ANT TV/VTR button.

Monitoring and recording SAP
Set the AUDIO MONITOR selector to STD and the STD AUDIO selector to SAP. Then SAP sound can be monitored and be recorded on the standard track.

Caution
- The QUICK TIMER button does not work during the timer setting standby mode. Press the TIMER REC ON/OFF button to clear the "TIMER REC", then press the QUICK TIMER button again.
- When the opening on the cassette rear is red (closed), the tape cannot be recorded.
  Then, if the QUICK TIMER button is pressed, the cassette will be ejected. Insert a cassette with its opening not closed (not red) and press the QUICK TIMER button again.

If a power interruption occurs
Recording will stop and power will turn off.
If the power interruption lasted for about 1 hour or less and recording time remains, recording will resume after the power comes back on.

Editing Tapes



shows the direction of the signal flow.

To Edit the Entire Tape to Another Tapes

When a video camera recorder or another VCR is connected to this VCR via the CONTROL L (LANC) jack, the synchronized editing function can be used (see page 35).

(1) Editing a tape on this VCR from a video camera recorder or another VCR

Example: *Using a video camera recorder as the player via* the LINE IN 2 AUDIO/VIDEO jack on this VCR.

Preparation
- Connect the equipment involved. If the video camera recorder is a monaural type, connect the white plug (AUDIO L) of the supplied connecting cable to the audio jack. (When stereo, connect to L and R.)
- Select the REC MODE (tape speed) on this VCR,SP or LP, using the REC MODE SP/LP button.
- Press the INPUT SELECT button to select LINE IN 2. Then "L2" will appear in the display window on this VCR. (When connected to LINE IN 1, press The button to select LINE IN 1 and to display "L1" in the display window.)
- Press the EDIT button so that "EDIT" appears the display window.
- Adjust the REC LEVEL control to around 5.

Operation

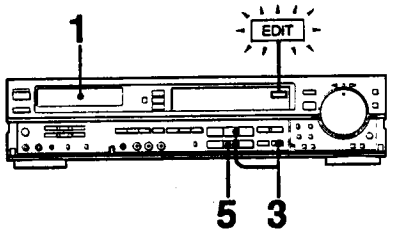
1 **Turn on the power of the equipment to be used. Insert the original cassette into the player and a new cassette into this unit.**

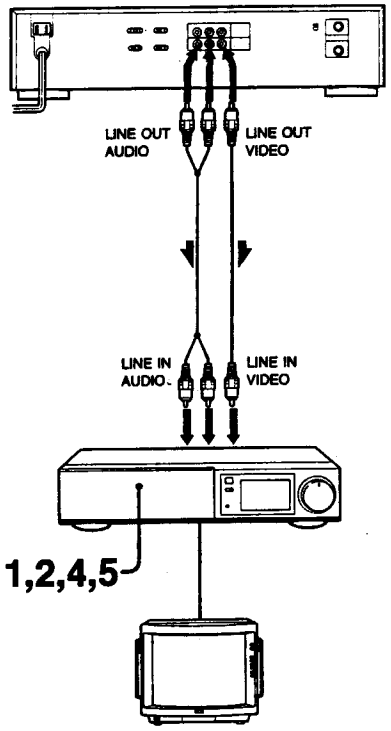
2 **Set the player to the playback pause mode and set the EDIT button to ON.**

3 **Set this unit to the recording pause mode.**

4 ***Release the pause modes simultaneously.***

Notes
- When the player is a stereo type, connect the audio plugs to the left and right jacks.
- LINE IN 1 VIDEO/AUDIO can be also connected to for use.





shows the direction of the signal flow.

(2) Editing a tape on another VCR from this unit

When this unit is the player and another VCR is the recorder:

Operation

1 **Turn on the power of the equipment to be used. Insert the original cassette to this unit and a new cassette to another VCR.**

2 **Set the input select switch of another VCR to LINE.**

3 **Set this unit to the palyback pause mode and press the EDIT button. The "EDIT" indication will light in the display window.**

4 **Set another VCR to the recording pause mode.**

5 **Release the pause modes simultaneously.**

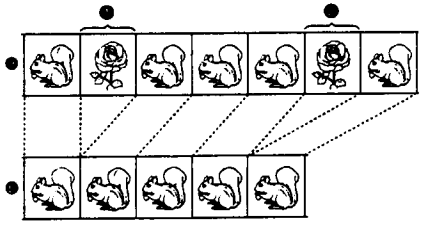
The EDIT button

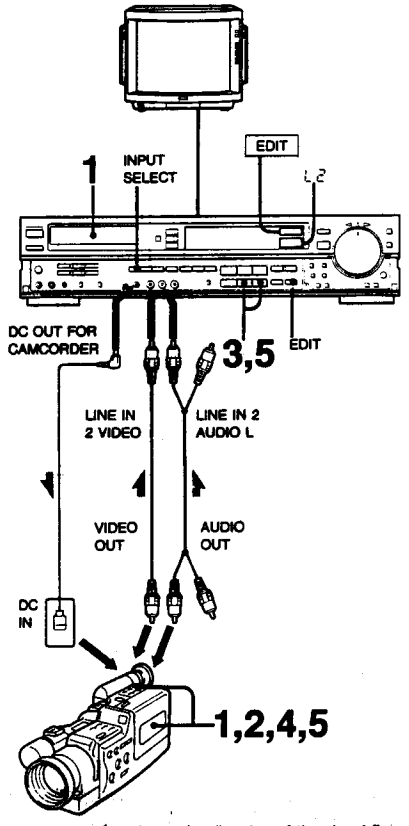
When editing a tape, press this button so that the "EDIT" indication lights in the display window. Deterioration of picture quality will be avoided. Press again after editing.

The SHARPNESS control will not function when the EDIT button is pressed.

Notes

- Avoid repetition of editing tapes, as the picture and tone quality will be impaired noticeably for newly edited tapes.
- When you make the recording and playback connections simultaneously to the same VCR, noise may come out.
- When another VCR is a monaural type, use the optional RK-C72 connecting cable.





shows the direction of the signal flow.

Editing only Desired Scenes

Cutting out unnecessary scenes
If another VCR has the CONTROL L (LANC) jack, the synchronized edit function can be used (see page 35).

❶ original tape
❷ edited tape
❸ cut out
❹ cut out

Example: Using a video camera recorder as the player via the LINE IN 2 AUDIO/VIDEO jack on this VCR.

Preparation

- Select the tape speed, SP or LP, on this VCR using the REC MODE selector.
- Press the INPUT SELECT button to select LINE IN 2, then "L2" will appear in the display window on this VCR. (When connected to LINE IN 1, press to select LINE 1, then "L1" will appear in the display window.)
- Set the EDIT button to ON then "EDIT" will appear in the display window.
- Adjust the REC LEVEL control to around 5.

Operation

1 **Turn on the power of the equipment to be used. Insert the original cassette to the player and a new cassette into this unit.**

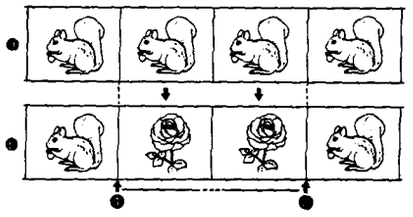
2 **Set the EDIT switch to ON.**

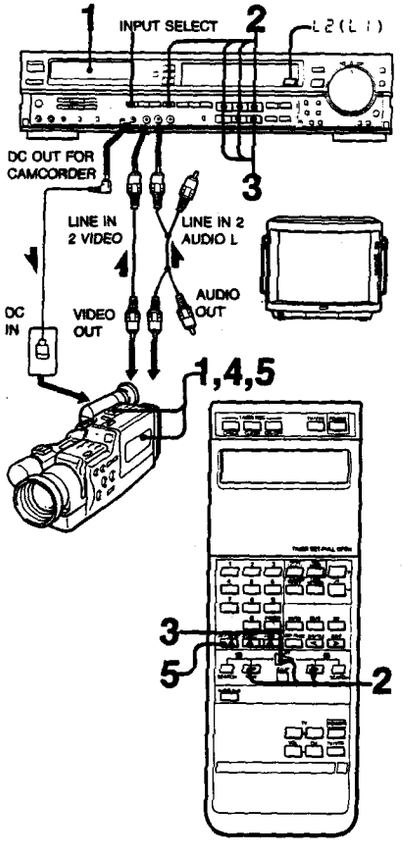
3 **Edit the tape while viewing the playback picture, and set this unit to the recording pause mode at the point where no picture is recorded.**

4 **Set the player to the playback pause mode at the point where the desired picture is recorded.**

5 **Release the pause modes simultaneously.**

Repeat steps 4 to 5 for recording other desired scenes.





Insert Editing

Inserting another scene into a recorded tape (original tape) is called "Insert Editing". This technique is used to replace an unnecessary scene with another one.
If the other VCR has a CONTROL L (LANC) jack, the synchronized edit function can be used.

- original tape
- edited tape
- starting point
- ending point

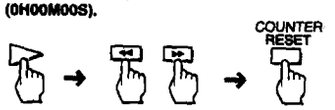
Preparation

- Set the REC MODE SP/LP to the same mode of the recorded tape (original tape).
- Press the EDIT button so that appears in the display window.
- Adjust the REC LEVEL control to around 5 position.

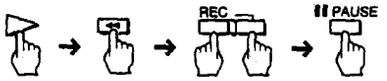
Operation

1 **Turn on the power of the equipment to be used. Insert the cassette with the scenes into the player. Insert the original cassette into this VCR.**

2 **Locate the ending point on the original tape by pressing ◀◀ REW or ▶▶ FF button during playback. Then press the COUNTER RESET button (0H00M00S).**



3 **Locate the starting point on the original tape by pressing ◀◀ REW button during playback. Set this VCR to the recording pause mode.**



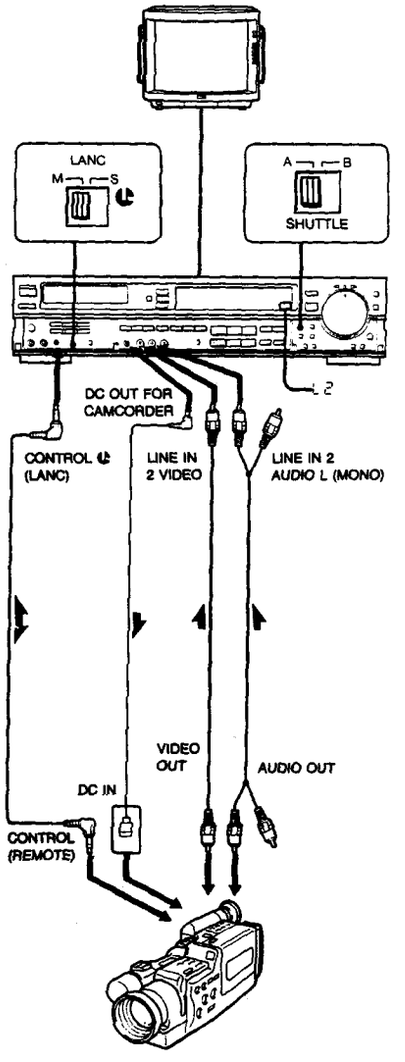
4 **Locate the starting point of the scene to be inserted on the player and set it to the playback pause mode.**

5 **Release the pause modes simultaneously. Stop the recording at the ending point (0H00M00S).**

For better editing
Release the playback pause mode a little earlier than the recording pause mode.

Notes
When the edited tape is played back, the picture may be disturbed momentarily at the ending point.

Synchronized Editing



shows the direction of the signal flow.

Overview
When a Sony VCR with the CONTROL L (LANC) jack or a video camera recorder is connected, the synchronized editing function can be used.
This function allows one VCR to control another VCR while editing. (Connect to the LINE IN 2 AUDIO/VIDEO on this VCR.)

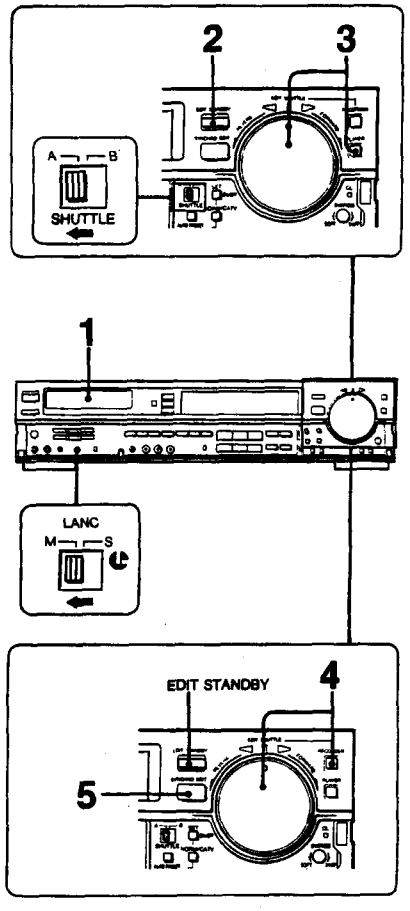
LANC switch
This switch is used to select control of the other VCR with this VCR, or control of this VCR with the other VCR.
M: Controls the other VCR with this VCR.
S: Control this VCR with the other VCR or editor.
When both VCRs have a LANC switch, decide which is to be M and which is S. Then select the LANC switch on both VCRs accordingly.

Selecting SHUTTLE A-B switch
Select the SHUTTLE A-B switch according to the type of VCR connected to this VCR.
A: The player VCR or camcorder without the JOG/SHUTTLE controls the other VCR (recorder) and any option is not applicable.
B: The player VCR with the JOG/SHUTTLE controls the other VCR or an option is applicable.

Connection

Example: When a video camera recorder is used as the player

Notes
- When the video camera recorder is a monaural type, connect the white plug of the supplied connecting cable to the AUDIO L jack. (When stereo, connect to L and R.)
- The power for the Video Camera Recorder (DC 7.5 V 1.6 A) is supplied from the DC OUT FOR CAMCORDER jack on the unit.



Preparation

- Select the tape speed, SP or LP, on REC MODE SP/LP button on this VCR.
- Select A on the SHUTTLE A-B switch.
- Select M on the CONTROL L switch.
- Connect the Video Camaera Recorder to the LINE 2 jack.
- Adjust the REC LEVEL control to around 5 position.

Operation

1 **Turn on the power of the equipment to be used. Insert the cassette.**
Insert a cassette for recording into this VCR and a recorded cassette into the other VCR.

2 **Press the EDIT STANDBY button.**
The EDIT STANDBY indicator and the player indicator will light. The LINE IN switch is set automatically to LINE IN 2 (L2).
The Video Camera Recorder (player side) enters the playback pause mode and this VCR enters the recording pause mode.
The picture from the player will be displayed on the screen.

3 **Search for the starting point to be recorded on the player.**
If the PLAYER button indicator does not light on, press the PLAYER button to turn the indicator on.
Then search for the starting point of the scene to be recorded through the tape on the player using the EDIT SHUTTLE control.
Release your finger from the EDIT SHUTTLE at the starting point to resume the playback pause mode.

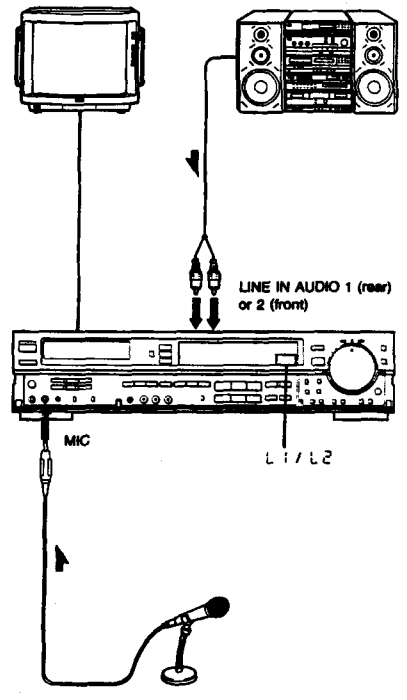
4 **Press the RECORDER button on the recorder to light the indicator on. Search for the starting point to be recorded over using the EDIT SHUTTLE control.**
To search for the point to be recorded over on the recording tape, turn the EDIT SHUTTLE to change to the picture on the recorder.
Release your finger from the EDIT SHUTTLE at the starting point to resume the recording pause mode.
The screen will display the picture on the player.

5 **By pressing the SYNCHRO EDIT button.**
Both the player and the recorder are released from the pause mode. Then playing and recording will start.

Note
Operate as described in steps 3 and 4 above to select the starting point for recording/playback. Press the SYNCHRO EDIT button again to start editing.
Repeat the steps 3 to 5 to edit.

To stop the synchronized editing
Press the EDIT STANDBY button. The lamp lights off and both the player and the recorder enter the stop mode. The INPUT SELECT will change to TV and the received TV program will appear on the screen.

Dubbing the Audio Signals



shows the direction of the signal flow.

You can additionally record music or narration on the PCM track of your tape, while the picture and sound pre-recorded on the standard track are unchanged.

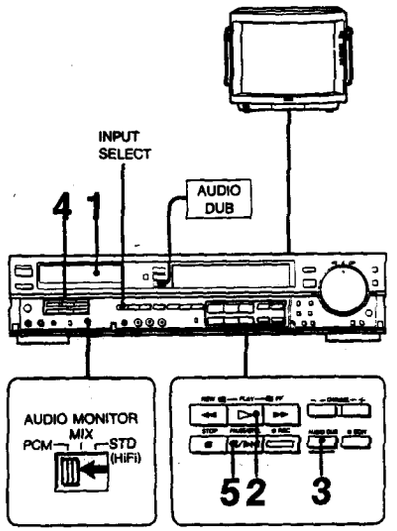
Connection on the Audio Source

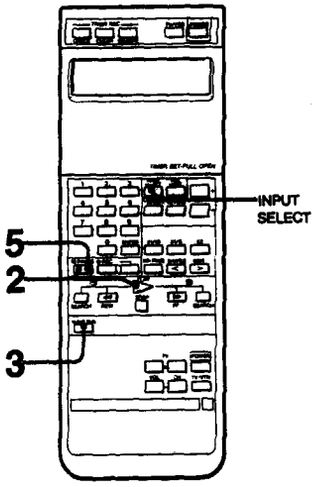
Notes

- Sound from the microphone is recorded in monaural.
- When the microphone is not in use, do not connect the microphone to the MIC jack or the sound will be mixed with the sound from the LINE IN AUDIO 1 or 2.
- Refer to each instruction manuals.

Tips for dubbing

- For fade-in operation, adjust the REC LEVEL control from the zero point to the normal position.
  For fade-out operation, turn it from the normal position to the zero point (LINE IN AUDIO only).
- The sound from the LINE IN AUDIO 1 jack on the rear panel or LINE IN AUDIO 2 jack on the front panel and the MIC jack can be mixed.
- Adjust the balance of the sound on the standard track and the sound dubbed on the PCM track with the REC LEVEL control.





Dubbing the Audio Signals

Preparation

- Turn on the TV and select the channel for the VCR or select the input for the VCR.
- Set the AUDIO MONITOR selector to PCM.
- *Press the INPUT SELECT button so that the L1 or L2 indication lights.*
- Adjust the REC LEVEL control to an appropriate level watching the level meter.

Operation

1 ***Insert the cassette.***

2 **While viewing the picture, decide the point to start audio dubbing and press the ⏸/▶▶| PAUSE/STILL button.**

3 **Press the AUDIO DUB button.**

4 **Playback the audio sources and adjust the REC LEVEL.**

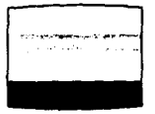
5 **Press the ⏸/▶▶| PAUSE/STILL button to release *the pause mode*, and at the same time start the audio source.**

To stop audio dubbing momentarily
Press ⏸/▶▶| PAUSE/STILL or ⏸ PAUSE.

To stop audio dubbing
Press ■ STOP.

To dub sounds from the TV
Press the INPUT SELECT button to select the "TUNER". Other operations are the same as the above steps.

Notes

- *The dubbed sound cannot be played back by a VCR without PCM recording or playback functions.*
- The pre-recorded sound on the PCM track will be erased by dubbing.
- 
During dubbing, black bars will appear in the center and lower positions of the screen. But it has no effect on the recorded images.
Picture may shake or colors may fade with certain TVs.

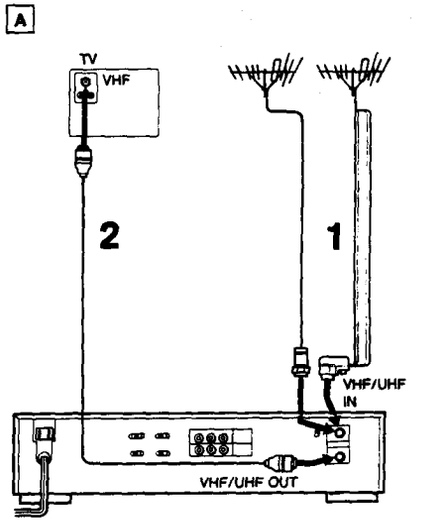
Connections

Notes

- *Unplug each unit from the wall outlet before making the following connections.*
- *Make sure the connections are secure. A loose connection may cause a noisy picture.*

Connecting the Antenna/Cable and TV

A If you only have a VHF antenna



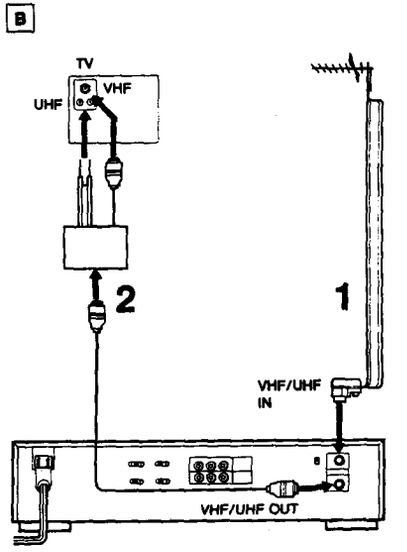
1 **Connect the antenna cable to VHF/UHF IN.**

- If your cable is a 300-ohm ribbon lead-in type (flat), use the supplied EAC-32 antenna connector. (See D.)
- If your cable is a 75-ohm coaxial type (round), use the optional F-type connector. (See C.)

2 **Connect the VHF/UHF OUT to the VHF input of your TV with the supplied 75-ohm coaxial cable.**

Notes
When using a 300-ohm cable, make sure that the cable is connected directly upward from the antenna terminal to keep it away from the unit as much as possible.

B If you only have a UHF antenna

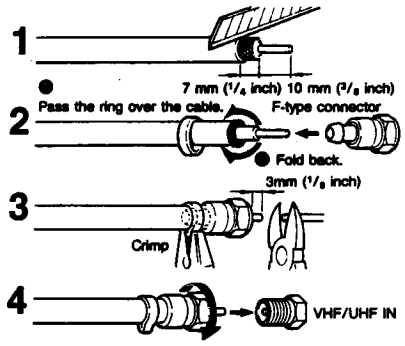


1 **Connect the antenna cable to VHF/UHF IN by using the supplied EAC-32 antenna connector. (See D.)**

2 **Connect the VHF/UHF OUT to the VHF and UHF terminals of your TV with the supplied 75-ohm coaxial cable and the optional U/V band separator.**

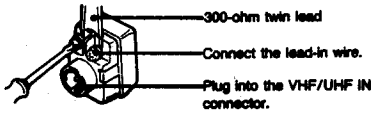
C

How to attach an F-type connector

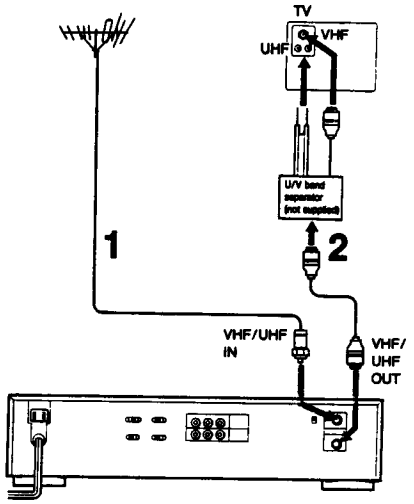


D

How to attach an antenna connector



E

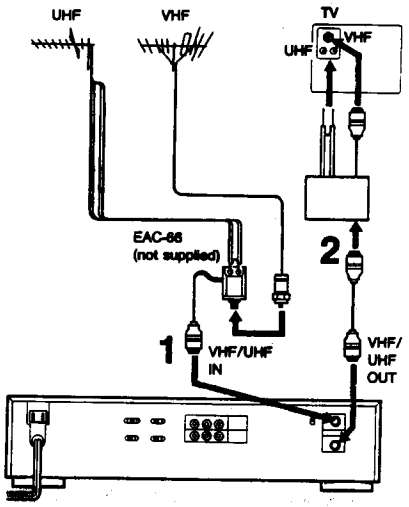


E If you have a VHF/UHF combination antenna.

1 **Connect the antenna cable to VHF/UHF IN** by using the optional F-type connector (not supplied). (See C.)

2 **Connect the VHF/UHF OUT to the VHF and UHF terminals of your TV** with the supplied 75-ohm coaxial cable and the optional U/V band separator. (Most combination antennas are equipped with a U/V band separator.)

F

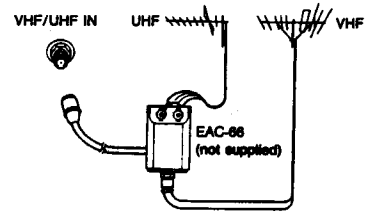


F If you have both VHF and UHF antennas

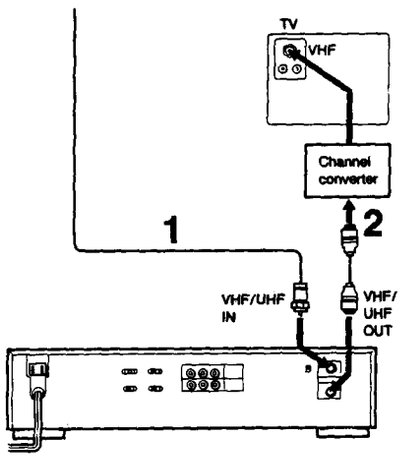
1 **Attach the optional EAC-66 U/V mixer to the VHF and UHF antenna cables and connect it to the VHF/UHF IN.** (See G.)

2 **Connect the VHF/UHF OUT to the VHF and UHF terminals of your TV** with the supplied 75-ohm coaxial cable and the optional U/V band separator.

G



H



H If you have a CATV cable
We recommend that you consult your cable company *to make sure that the cable is properly connected.*

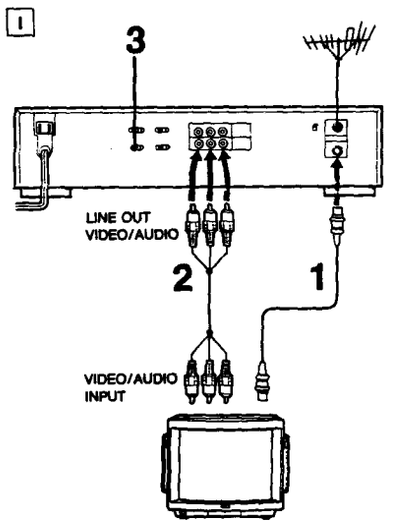
1 **Connect the CATV cable to the VHF/UHF IN** by using the optional F-type connector.

2 **Connect the VHF/UHF OUT to a channel converter and then to the VHF terminal of the TV.**

When the TV is not compatible with cable TV
Connect the cable TV channel converter between the VCR and the TV so that while you watch one cable TV program, you can record another cable TV program.

Note to CATV system installer in the U.S.A.
This reminder is provided to call the cable TV system installer's attention to Article 820-22 of the NEC that provides guidelines for proper grounding and, in particular, specifies that the cable ground shall be connected to grounding system of the building as close to the point of cable entry as practical.

I



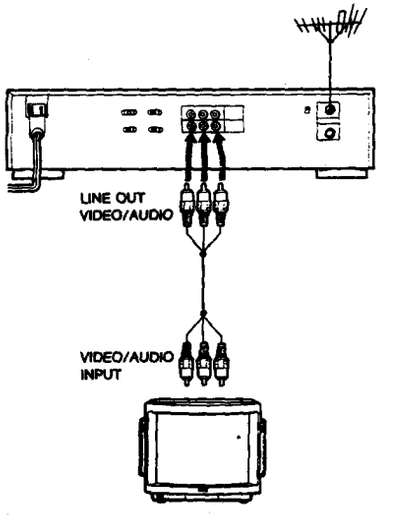
I Connecting a TV Equipped with Video and Audio Input Jacks

1 **Connect your antenna to the VHF/UHF IN and connect the VHF/UHF OUT to your TV.** (See pages 39–42.)

2 **Connect the LINE OUT VIDEO and AUDIO jacks to the video and audio input jacks on the TV.**

3 **Set the ANTENNA. SW selector in the rear panel to MANUAL.**

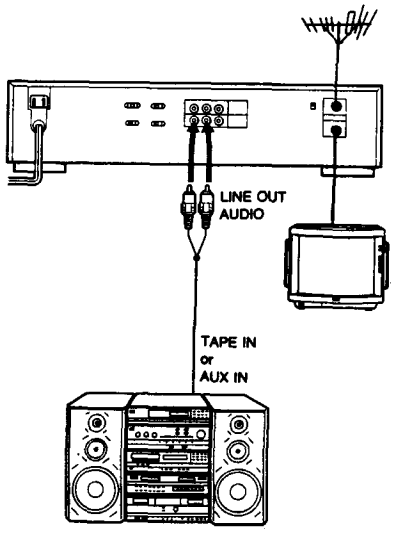
J



J Connecting a Color Monitor

Connect the LINE OUT VIDEO and AUDIO jacks to the video and audio input jacks on the monitor.

K



K Connecting an Audio System

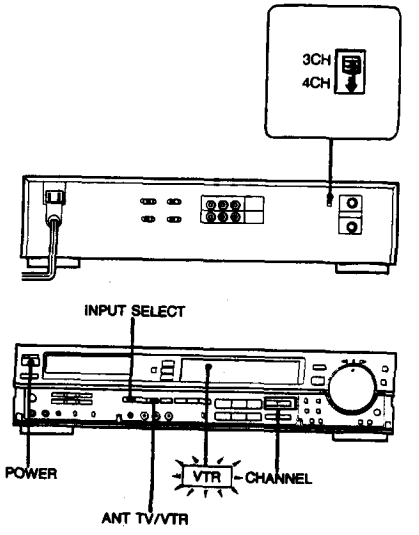
You can listen the sound of a cassette by connecting your stereo system.

Connect *LINE OUT AUDIO* of the VCR to the TAPE IN (or AUX IN) jack of a stereo amplifier.

Notes

- If the VCR is installed near a tuner or a radio, noise may occur in the AM reception. In this case do one of these: keep the VCR away from the tuner or the radio, adjust the AM bar antenna for minimum noise, or connect an external AM antenna to the tuner.
- Note that PCM recorded cassette reproduce sounds over a wide dynamic range. Adjust the volume carefully to protect your speaker from damage.
- Before connecting or disconnecting the power cord of the VCR, be sure to turn the amplifier off.

Adjusting the TV



Adjust your TV to receive the signals from your VCR. The following adjustment is unnecessary if you are using a color monitor or a TV equipped with VIDEO/AUDIO input jacks.

If you do not have a recorded video cassette tape

1 **Set the RF UNIT channel selector** located at the rear of the VCR to 3CH or 4CH whichever channel is not active in your area.

2 ***Press the POWER switch.***
The indication lights.

3 **Press the ANT TV/VTR button** to display the "VTR" indication in the display window.

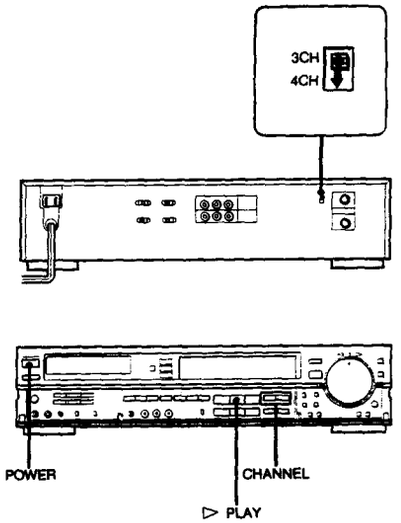
4 **Press the INPUT SELECT button *so that the* TUNER indication is displayed in the display window and then select an active channel in your area with the CHANNEL +/– button.**

5 **Turn on the TV.**

6 ***Set the TV receiver to either VHF channel 3 or 4 to agree with the RF UNIT setting.***
The TV program selected on the VCR will be displayed on the TV screen. If a picture does not appear on the TV screen or if the display is not clear, fine-tune the channel on the TV. For details about TV *channel adjustment, see the instruction manual* of the TV.

Check!
Check that the program displayed on the screen changes when a different channel is selected on the VCR.
If the program does not change, repeat the preceding steps.

Now your TV receiver is tuned to the VCR.
Whenever you use the video recorder, you should set the TV to the channel which you have chosen above.



If you have a recorded video cassette tape

1 **Set the RF UNIT channel selector** located at the rear of the VCR to 3CH or 4CH, whichever channel is not active in your area.

2 **Press the POWER switch.**
The indication lights.

3 **Insert the cassette.**

4 **Press the ▷ PLAY button.**

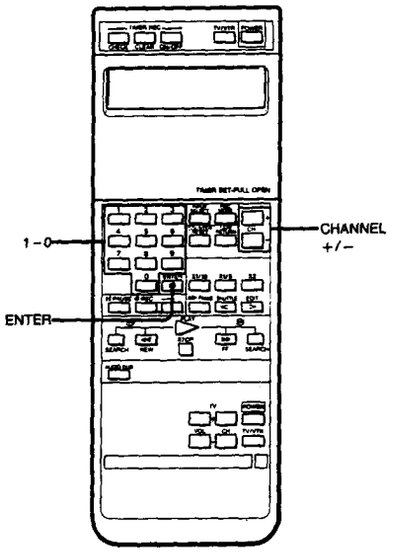
5 **Turn on the TV.**

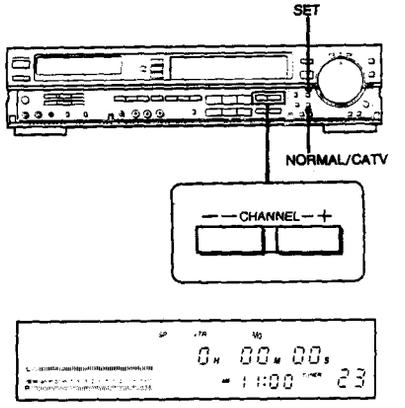
6 **Set the TV receiver to either VHF channel 3 or 4 to agree with the RF UNIT setting.**
The TV program selected on the VCR will be displayed on the TV screen. If a picture does not appear on the TV screen or if the display is not clear, fine-tune the channel on the TV.
- For details about TV channel adjustment, see the instruction manual of the TV.

Check!
Check that the display on the screen changes when you stop the tape by pressing the ■ STOP button on the VCR. (To eject the cassette, press the ⏏ EJECT button.)
If the program does not change, repeat the preceding steps.

Now your TV receiver is tuned to the VCR.
Whenever you use the video recorder, you should set the TV to the channel which you have chosen above.

Presetting TV Channels





Selecting TV Channels

Your recorder is capable of receiving VHF channels 2-13, UHF channels 14-69 and cable TV channels 1(A-8), 98-99(A-2 to A-1),14-36(A to W), 66-125(W+30 to W+84). The channel numbers 1-199 will appear in the display window.
This unit is preset at the factory to receive certain channels. There are two ways to select the channels.

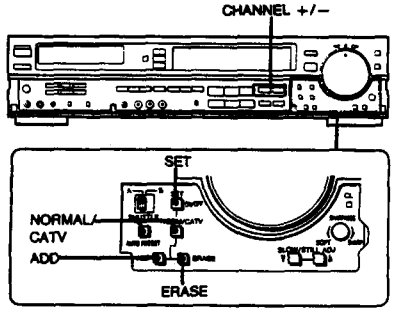
Using the channel number buttons and ENTER button on the Remote Commander

To receive a broadcasting on the air
Press the numeral(s) of the channel and then press ENTER.
Ex. Channel 6

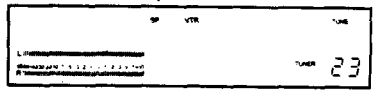
Channel 12

To receive a CATV
Press the SET button on the VCR at first. Press the NORMAL/CATV button to display "CATV". Press the SET button again. Then select the channel as shown above.

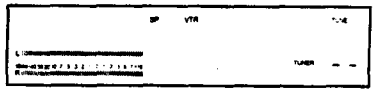
Using CHANNEL +/- on the VCR or on the Remote Commander.
For lower-numbered channels, press "-", and for higher-numbered channels, press "+". The channel will change consecutively by holding the button down.
If the picture of your desired channel does not appear in the above procedure, preset the channel as in "Auto preset" on page 49.



When SET button is pressed.



When ERASE or ADD button is pressed.



To Erase Channels

1 **Press the SET button.**

2 **Select the air or CATV on the NORMAL/CATV button.**

3 **Select the channel number on the CHANNEL +/– button or press the channel number and ENTER button on the Remote Commander.**

4 **Press the Erase button**
The "– –" indication will appear momentarily indicating that the channel has been erased.

5 **Press the SET button again.**

To erase other channels, repeat the steps 1 to 5.
You will see the channels erased are skipped over in numerical sequence when you press the CHANNEL +/– button later.

To Add the Erased Channels Again

1 **Press the SET button.**

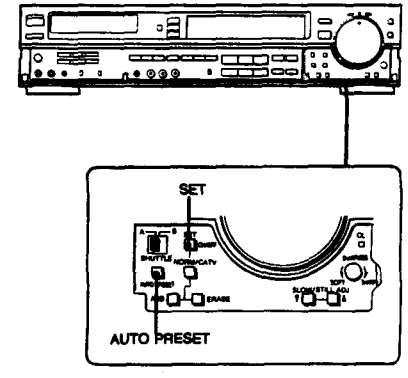
2 **Select the air or CATV on the NORMAL/CATV button.**

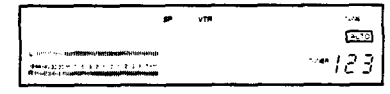
3 **Select the channel number and ENTER buttons on the Remote Commander.**

4 **Press the ADD button.**
The channel number appears momentarily indicating that the channel has been added.

5 **Press the SET button again.**

To add other channels, repeat the steps 2 to 4.
You will see the channels added appear in the proper numerical sequence when you press the CHANNEL +/– button later.





Auto Preset

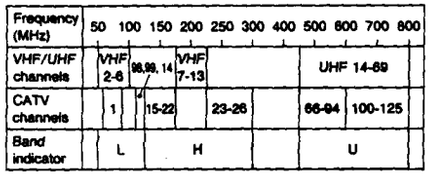
This VCR automatically searches channels from VHF/UHF 2ch to 69ch (CATV 1ch to 125ch), then performs ADD on broadcasting channels and ERASE on channels without broadcasting.

1 **Press the SET button.**

2 **When receiving a CATV broadcast, select CATV on the NORMAL/CATV button.**

3 **Press the AUTO PRESET button to light on "AUTO" in the display window.**
The VCR starts searching from VHF/UHF 2ch to 69ch (CATV 1ch to 125ch) then automatically escape from preset mode.

Channel Allocation Chart



When the CHANNEL + button is pressed, the above channels will be scanned from the lowest frequency to the highest in sequence. Pressing the CHANNEL – button will scan the channels reversely.

Cable TV Channel Chart*

Cable TV system use letters or numbers to designate channels.
To tune in a channel, refer to this chart.

Number on this TV	1	98	99	14	15	16	17
Corresponding CATV channel	A-8	A-2	A-1	A	B	C	D

18	19	20	21	22	23	24	25	26	27	28	29	30
E	F	G	H	I	J	K	L	M	N	O	P	Q

31	32	33	34	35	36	66	94	100	101	102	.....	123
R	S	T	U	V	W	W+30	W+58	W+59	W+60	W+61	.....	W+82

124	125
W+83	W+84

Check with your local cable TV company for more complete information on the available channels.

* The designation of the cable TV channels conforms to the EIA/NCTA recommendation.

Note
Pay cable TV systems use scrambled or encoded signals and require special converters (decoders) in addition to the normal cable connections.

Precautions

On safety

- Operate the unit only on 120 V AC.
- Should any solid object or liquid fall into the cabinet, unplug the unit and have it checked by qualified personnel before operating it any further.
- One blade of the plug is wider than the other for the purpose of safety and will fit into the power outlet only one way. If you are unable to insert the plug fully into the outlet, contact your dealer.
- Unplug the unit from the wall outlet if it is not to be used for an extended period of time. To disconnect the cord, pull it out by the plug. Never pull the cord itself.

On installation

- Allow adequate air circulation to prevent internal heat build-up. Do not cover the holes on the top panel.
- Do not place the unit on surfaces (rugs, blankets,etc.) or near materials (curtains, draperies) that may block the ventilation slots.
- Do not install the unit near heat sources such as radiators or air ducts or in a place subject to direct sunlight,excessive dust, mechanical vibration or shock.
- The unit is designed for operation in a horizontal position. Do not install it in an inclined position.
- Keep the unit and cassette tapes away from equipment with strong magnets, as for example a microwave oven or a large loudspeaker and so on.
- Do not place any heavy object on the unit.
  Never place any object on the tuning compartment nor on the top of the front panel.

On operation

- When the unit is not in use, turn the power off to conserve energy and to extend its useful life.
- Remove and store a video cassette after recording or playback.

On cleaning

Clean the cabinet, panel and controls with a dry soft cloth, or a soft cloth lightly moistened with a mild detergent solution.
Do not use any type of solvent, such as alcohol or benzine which might damage the finish.

On repacking

Do not throw away the carton and packing materials. They make an ideal container in which to transport the unit. When shipping the unit to another location, repack it as shown the illustration on the carton.

On cassette care

Store cassettes in their cases and keep them in an upright position to prevent intrusion of dust and uneven winding.

On moisture condensation

- **Main Unit**
  Do not operate the unit right after having transported it from a cold location to a warm location or in a room where the temperature rises suddenly, because moisture may condense in the operating section of the unit. Wait for about an hour before turning the power on in the new location or keep the rise in room temperature gradual. If the unit is operated with moisture condensation,the unit and the tape may be damaged. Therefore remove the tape immediately when there is a possibility of moisture condensation and no picture is obtained. To evaporate the moisture rapidly, leave the player turned on without a tape loaded.
- **Cassette**
  When a cassette tape is carried from a cold place to a warm place, the cassette tape may become wet with dew created by moisture condensation. When there is any possibility of moisture condensation, eject the cassette tape and leave it outside of the compartment for about one hour.

If you have any questions about this unit,contact your Sony dealer.

Specification

System

Video recording system	Rotary two-head helical scanning FM system
Audio recording system	
Standard:	Rotary head, FM system (2 channels)
PCM:	PCM system (2 channels)
Video signal	EIA standard, NTSC color
Usable cassettes	8 mm video format cassettes
Tape speed	SP: approx. 1.43 cm/sec. LP: approx. 0.72 cm/sec.
Recording/playback time	SP: 2 hrs. LP: 4 hrs. (with Sony P6-120 cassette)
Fast-forward/rewind time	Approx. 4 min. (with Sony P6-120 cassette)

Tuner section

Channel coverage	VHF channels 2-13 UHF channels 14-69 Cable TV channels 1,14-36, 66-94,98,99,100~125
VHF output signal	Channel 3 or 4 (selectable) 75 ohms, unbalanced
Antenna	75 ohms, F-type connector for VHF/UHF IN and VHF/UHF OUT

PCM

Sampling frequency	31.5 kHz
Audio frequency	20 ~ 15 kHz
Dynamic range	More than 85 dB
Wow and flutter	Less than 0.005 % RMS

Inputs and outputs

Video input	Phono jack 1 Vp-p, 75 ohms, unbalanced, sync negative
Video output	Phono jack 1 Vp-p, 75 ohms, unbalanced, sync negative
Audio input	Phono jack ×2 −7.5 dBs (0 dBs = 0.775 V rms) more than 47 kilohms
Audio output	Phono jack ×2 −7.5 dBs (327 mV) (at load impedance 47 kilohms) Less than 10 kilohms
Microphone input	Minijack −60 dBs, for low impedance microphone
Headphone jack	Stereo minijack −26 dBs, 8 ohms
AC outlet	120 V AC, 60 Hz, 400 W (max.), unswitched
DC out for Camcorder	7.5 V DC, 1.6 A
Control L	Stereo mini-mini jack

Timer

Clock	Crystal lock
Timer indication	12-hour cycle
Timer setting	Only for recording 6 events/1 month max.

General

Power requirements	120 V AC, 60 Hz
Power consumption	35 W (max.)
Operating temperature	5°C to 40°C (41°F to 104°F)
Storage temperature	−20°C to +60°C (−4°F to +140°F)
Dimensions	Approx. 430 × 100 × 302 mm (w/h/d) Approx. 17 × 4 × 12 inch
Weight	Approx. 5.2 kg (11 lb 1/2 oz)

Accessories supplied

See pages 8,9.

Remote Commander RMT-455

Remote control system	Infrared control
Command mode	Selectable VTR 1, 2 or 3
Power reqirements	3V DC 2 size AA batteries (IEC designation R6)
Dimensions	Approx. 77.5 × 20 × 219 mm (w/h/d) Approx. 3 × 3/4 × 8 1/2 inches incl. projecting parts and controls
Weight	Approx. 170 g (2.2 oz) without batteries

Design and specifications subject to change without notice.

Notes on Video Heads

Video heads cleaning

VCRs used for a long time may play back the rough picture or do not display the picture. The possible cause may be the contamination of the video heads. In such a case, clean the video heads at first. Use the video head cleaning tape V8-25CLH (not supplied) or ask the Sony service personnel to clean the video heads.
If the picture is not clear in using a cassette tape of another type, sometimes it is effective to use the video head cleaning tape. Use it after reading the instruction manual carefully.

Video heads wear by long time using

If the VCR displays unclear picture after cleaning of the video heads, the replacement of the video heads is necessary. Consult the dealer or the Sony representative.

Check the video heads after 1,000 hours use.

VCR is a high precision machine. It must record on or play back from magnetic tapes on which the image signals from the color TV or the video camera recorder are recorded.
The video head or mechanical parts to transport the tape are contaminated or weared in a long time use. It is recommended to have the VCR checked (cleaning, oiling and replacing weared parts) about 1,000 hours interval.

Use the video cleaning tape if you find the symtom as follows:

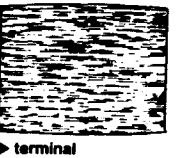
Normal picture

Symptoms caused by contaminated video heads

• **Rough picture**

• **Unclear picture**

• **No picture**

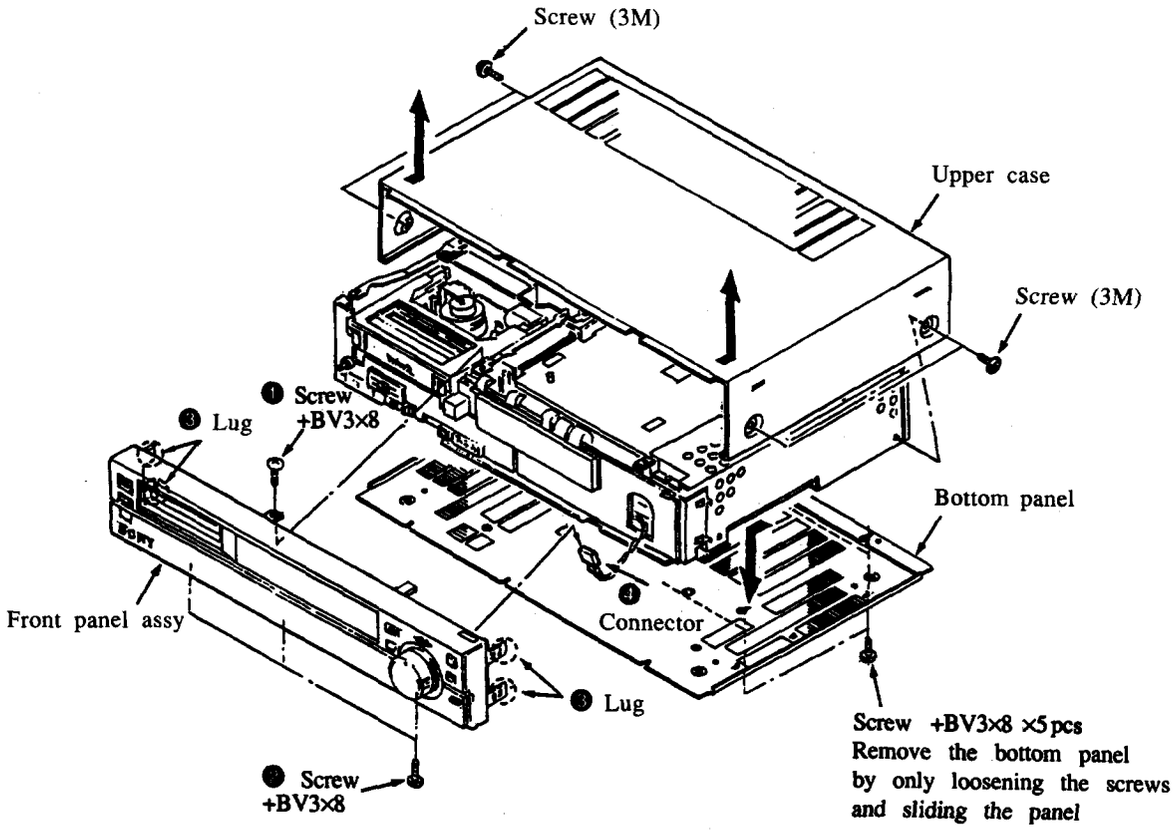


initial → terminal

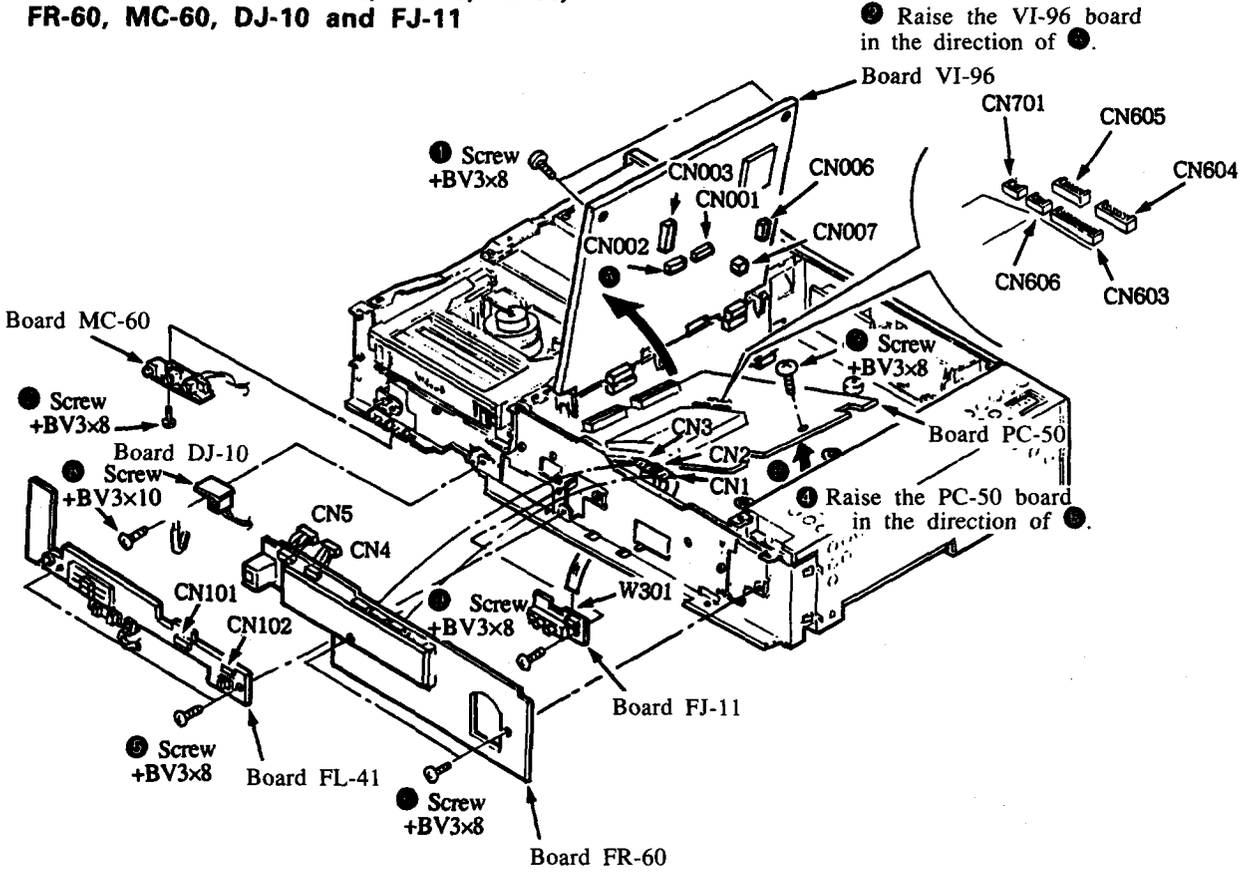
Above symptom may occur in playback.
Most possible cause of this may be the contamination of video heads.
Purchase the video cleanig tape V8-25H at your dealer or a Sony shop.

SECTION 3
DISASSEMBLY

3-1. UPPER CASE, BOTTOM AND FRONT PANELS



3-2-1. Removal of boards VI-96, PC-50, FL-41, FR-60, MC-60, DJ-10 and FJ-11

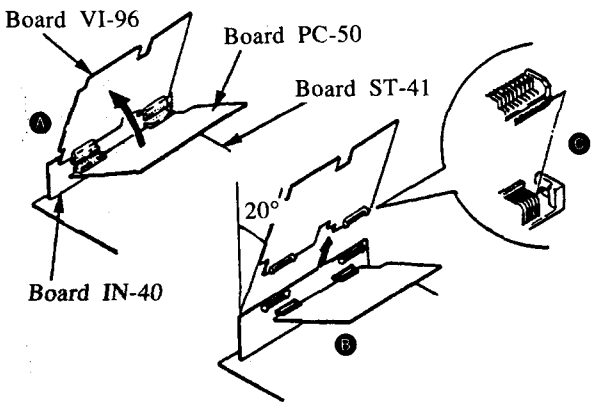


3-2-2. Removal of board connected with board to board connector

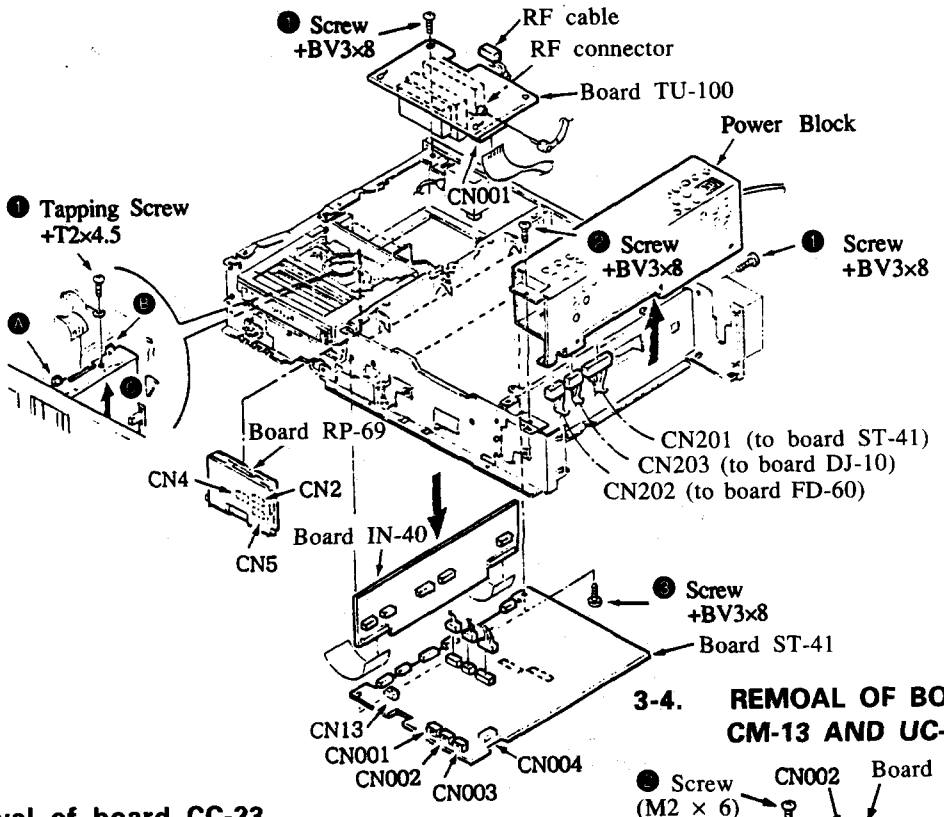
Example: Board VI-96 is removed from board IN-40.

1) Raise the VI-96 board as shown in Ⓐ.
2) Draw the VI-96 board in the direction of 20° from the IN-40 board as shown in Ⓑ.
3) Remove another PC-50 board in the same way.
4) To mount a board, engage the connector into the socket as shown in Ⓒ and insert.

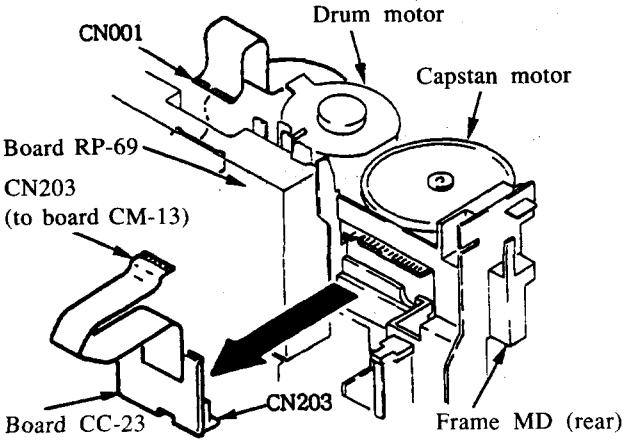
Note: If forcefully pulled, the connector or pattern may be damaged, so be careful.



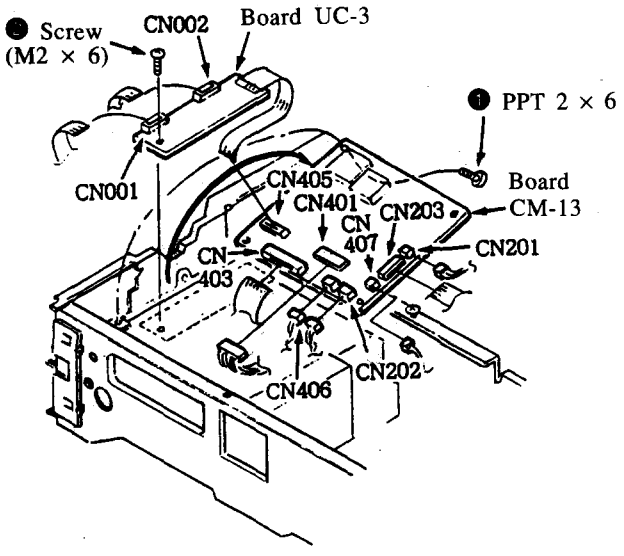
3-3-1. Removal of Power block and boards ST-41, IN-40, RP-69, and TU-100



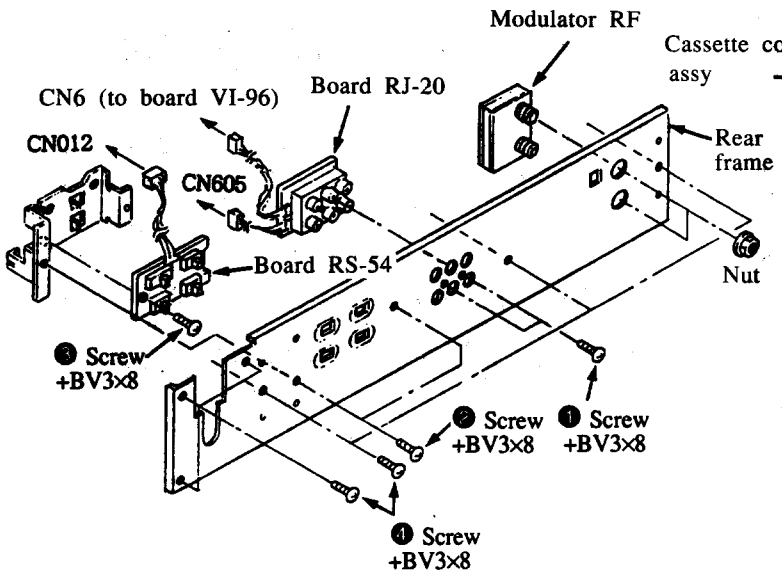
3-3-2. Removal of board CC-23



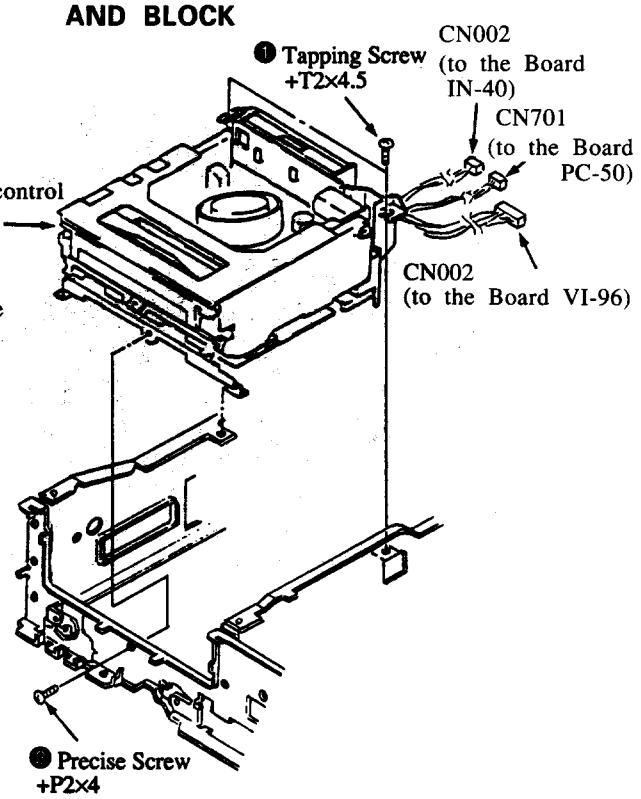
3-4. REMOAL OF BOARDS CM-13 AND UC-3



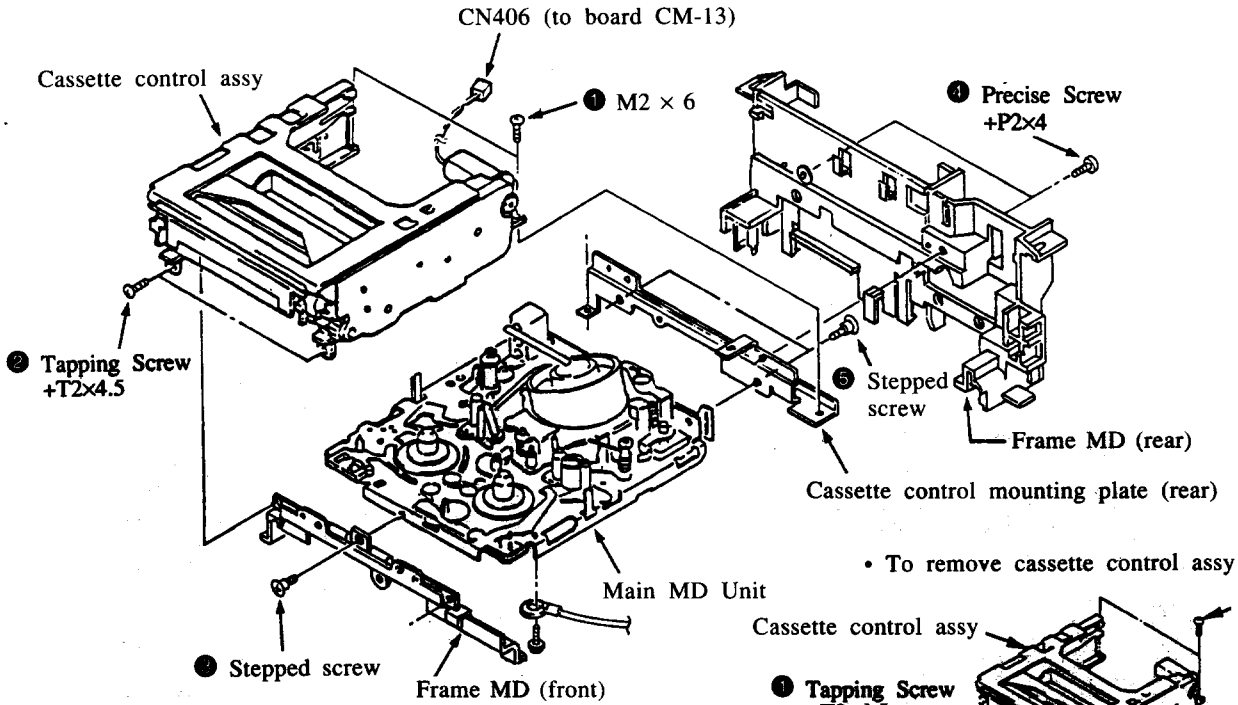
3-5. REMOVAL OF REAR FRAME, MODULATOR RF AND BOARD RJ-20



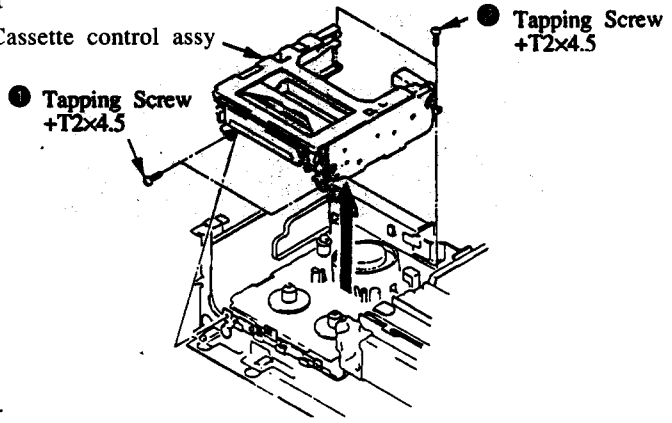
3-6. REMOVAL OF MD, CASSETTE CONTROL AND BLOCK


❶ Tapping Screw +T2×4.5
CN002 (to the Board IN-40)
CN701 (to the Board PC-50)
Cassette control assy
CN002 (to the Board VI-96)
❷ Precise Screw +P2×4

3-7. REMOVAL OF MAIN MD UNIT



• To remove cassette control assy only

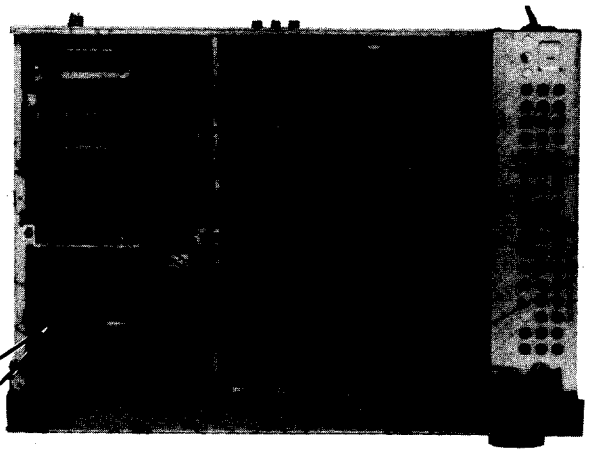


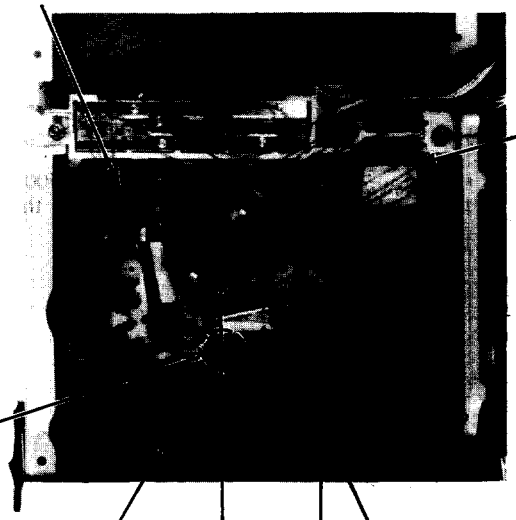
3-8. INTERNAL VIEW OF MECHANICAL DECK UNIT AND NAME OF EACH PART

Loading motor assy
A-7040-160-A

FL motor assy (M901)
X-3731-108-1

— Upper side —





Tape top/
tape end LED
(GL-452S)
8-719-940-81

S reel Table assy
X-3728-851-1

T reel Table assy
X-3728-855-1

PINCH ARM BLOCK Ass'y
A-7040-219-A

Drum assy (DGU-33B-R)	A-7048-281-A
Revolution upper drum assy (DGR-33-R)	A-7049-183-A

Capstan motor (M902)
8-835-331-01

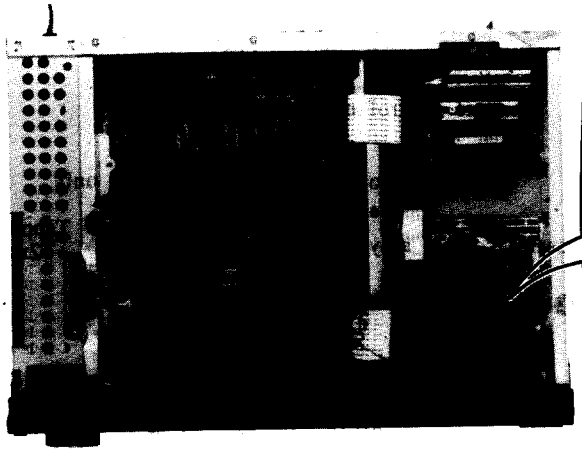
Drum motor

Tape top sensor
(EE-TP109)
8-729-906-48

Timing belt (S)
3-728-866-11

Tape top sensor
(EE-TP109)
8-729-906-48

— Lower side —

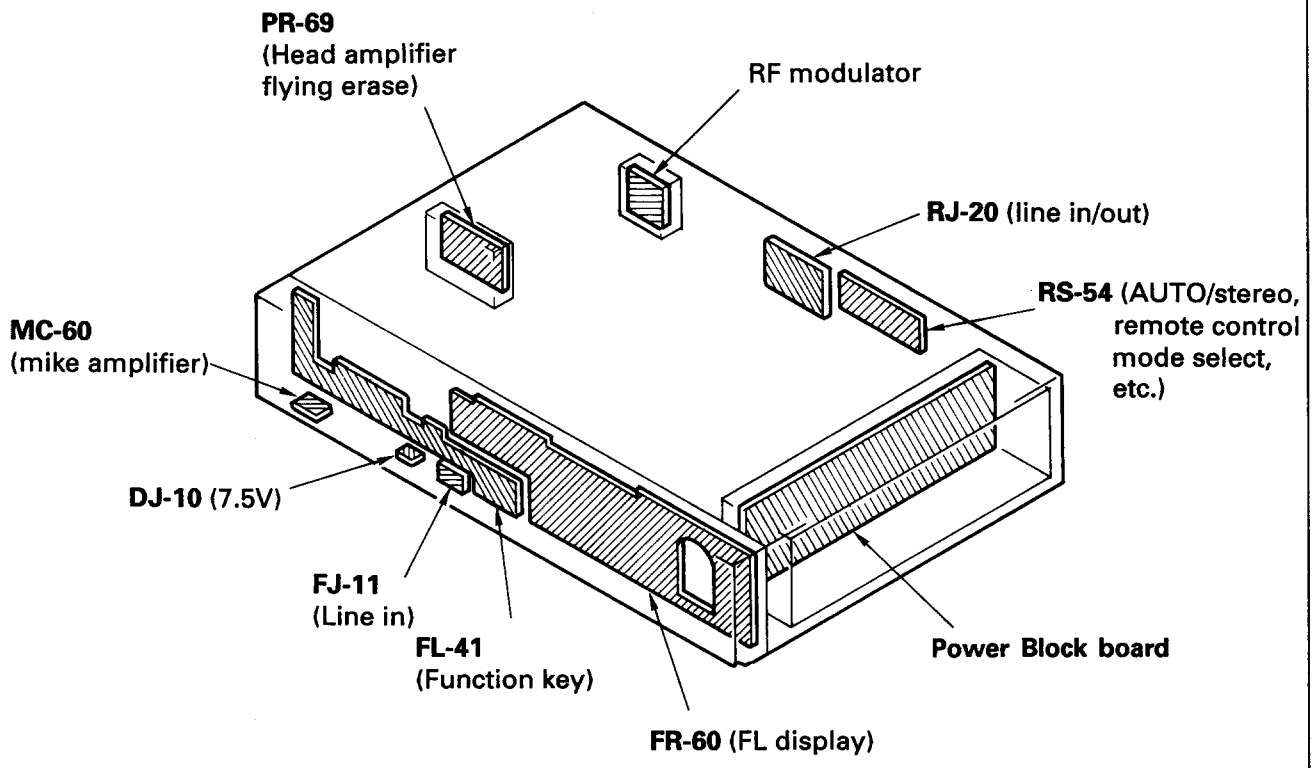


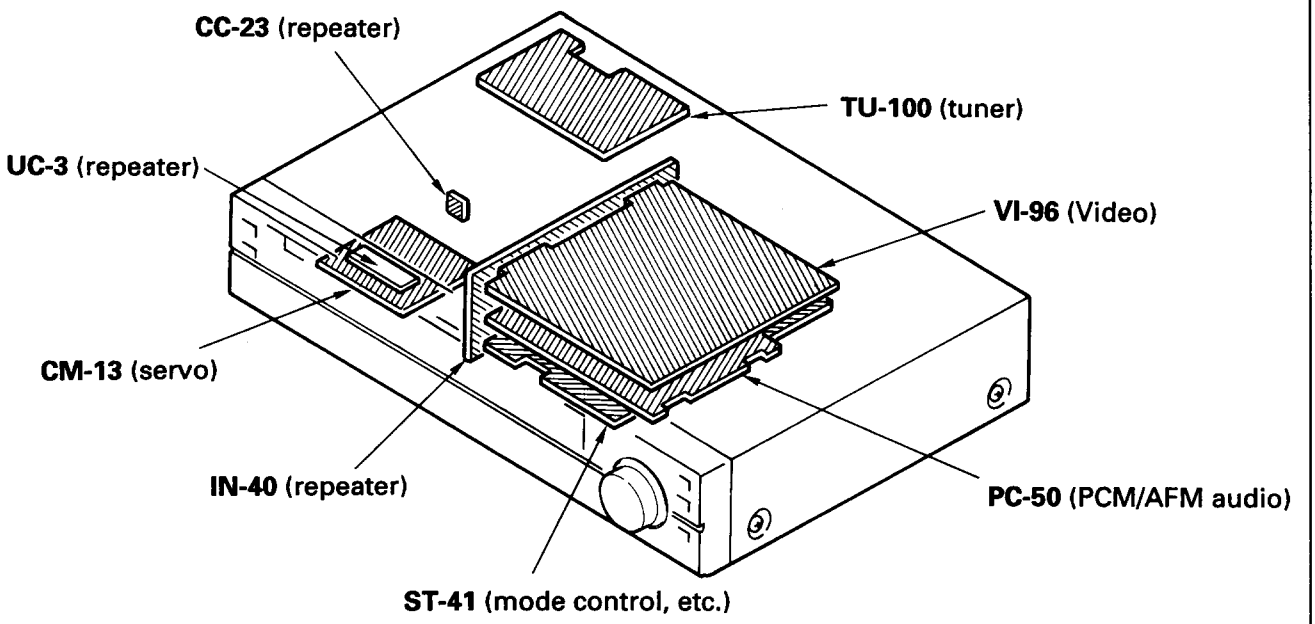
Timing belt (L)
3-741-197-01

RK gear assy
X-3728-866-1

SECTION 4
DIAGRAMS

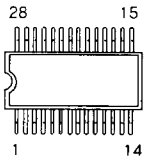
4-1. CIRCUIT BOARDS LOCATION



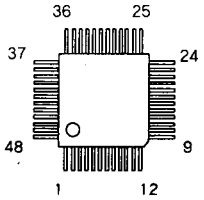


5-3. SEMICONDUCTORS

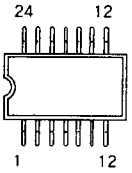
BA6800AF
CXD1077M
CXL1008M



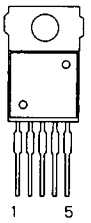
CXA1202Q-Z
CXA1449Q



CX20114



MC14052BF
MC14538BF



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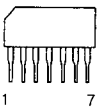

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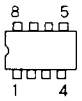

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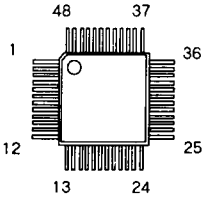

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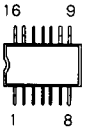

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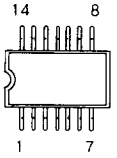

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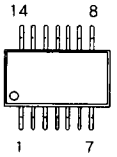

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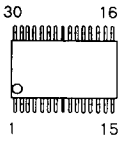

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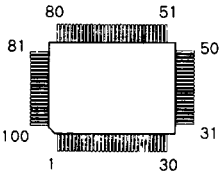

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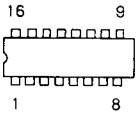

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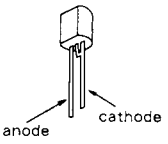

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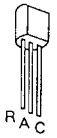

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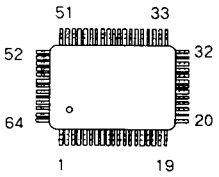

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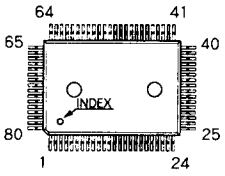

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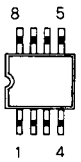

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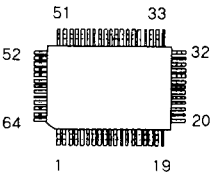

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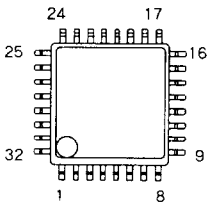

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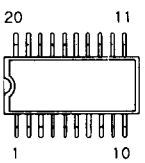

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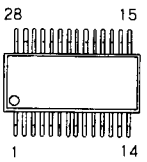

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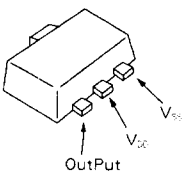

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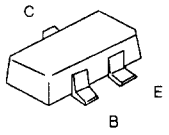

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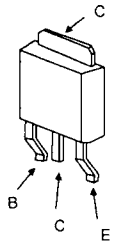

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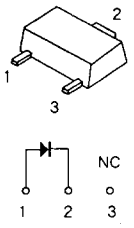

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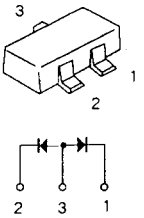

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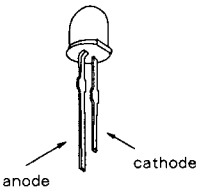

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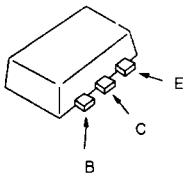

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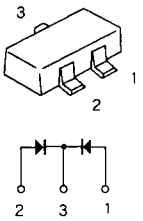

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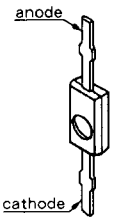

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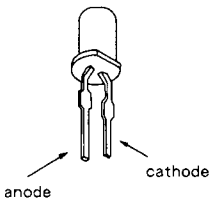

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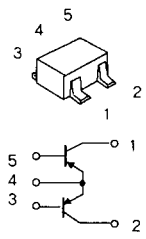

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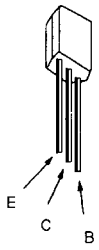

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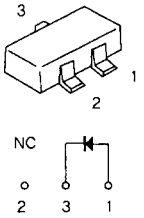

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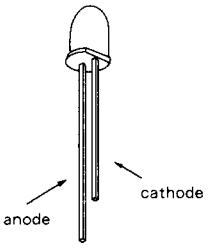

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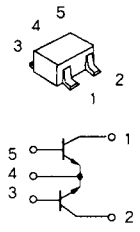

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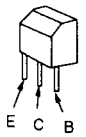

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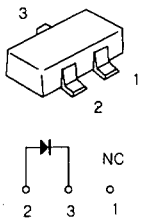
RD9.1M-B3



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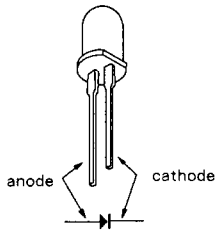

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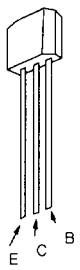

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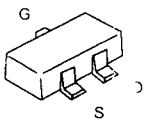

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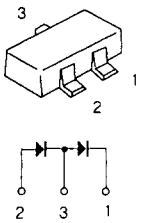

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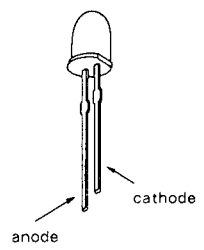
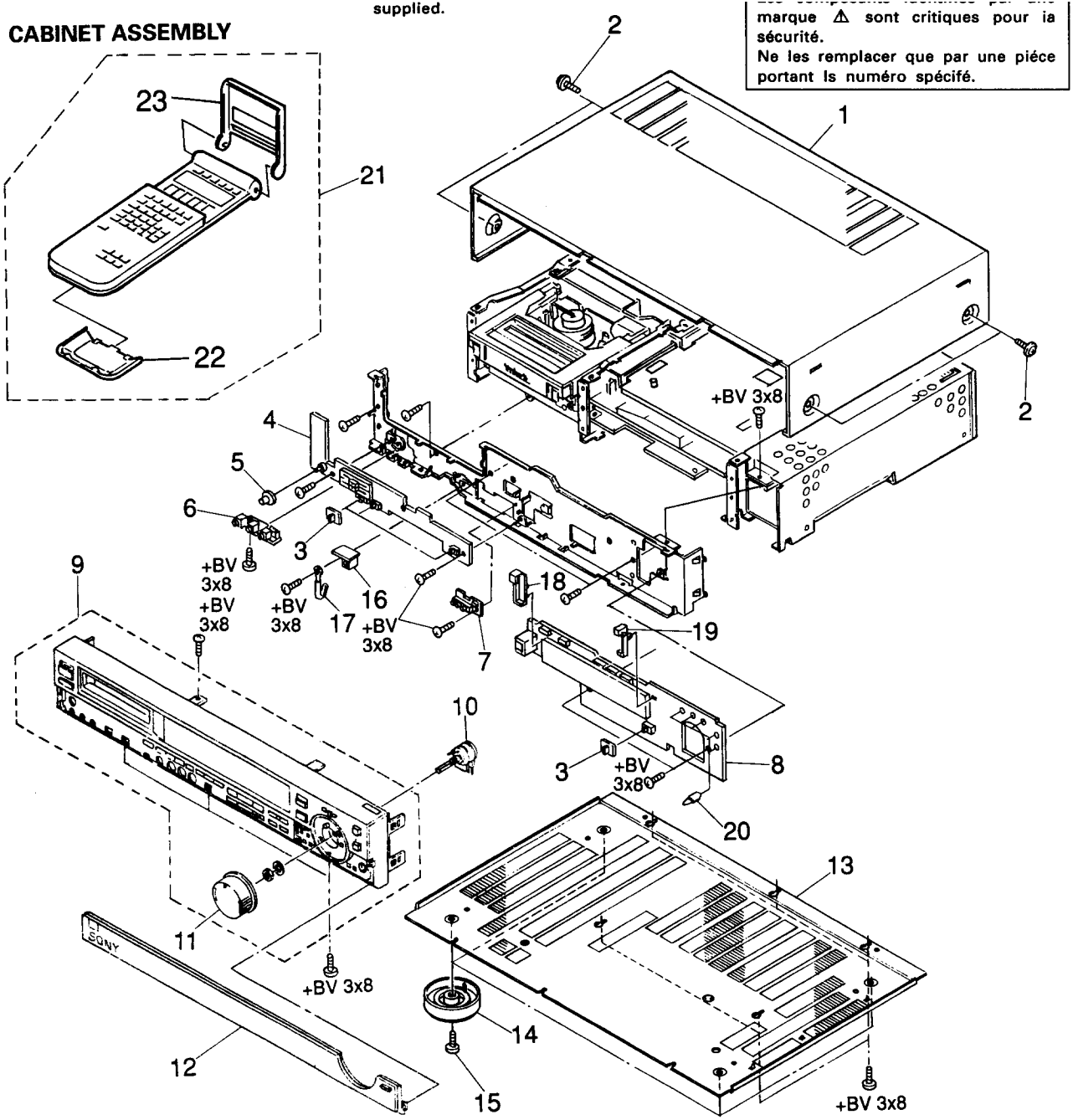


supplied.

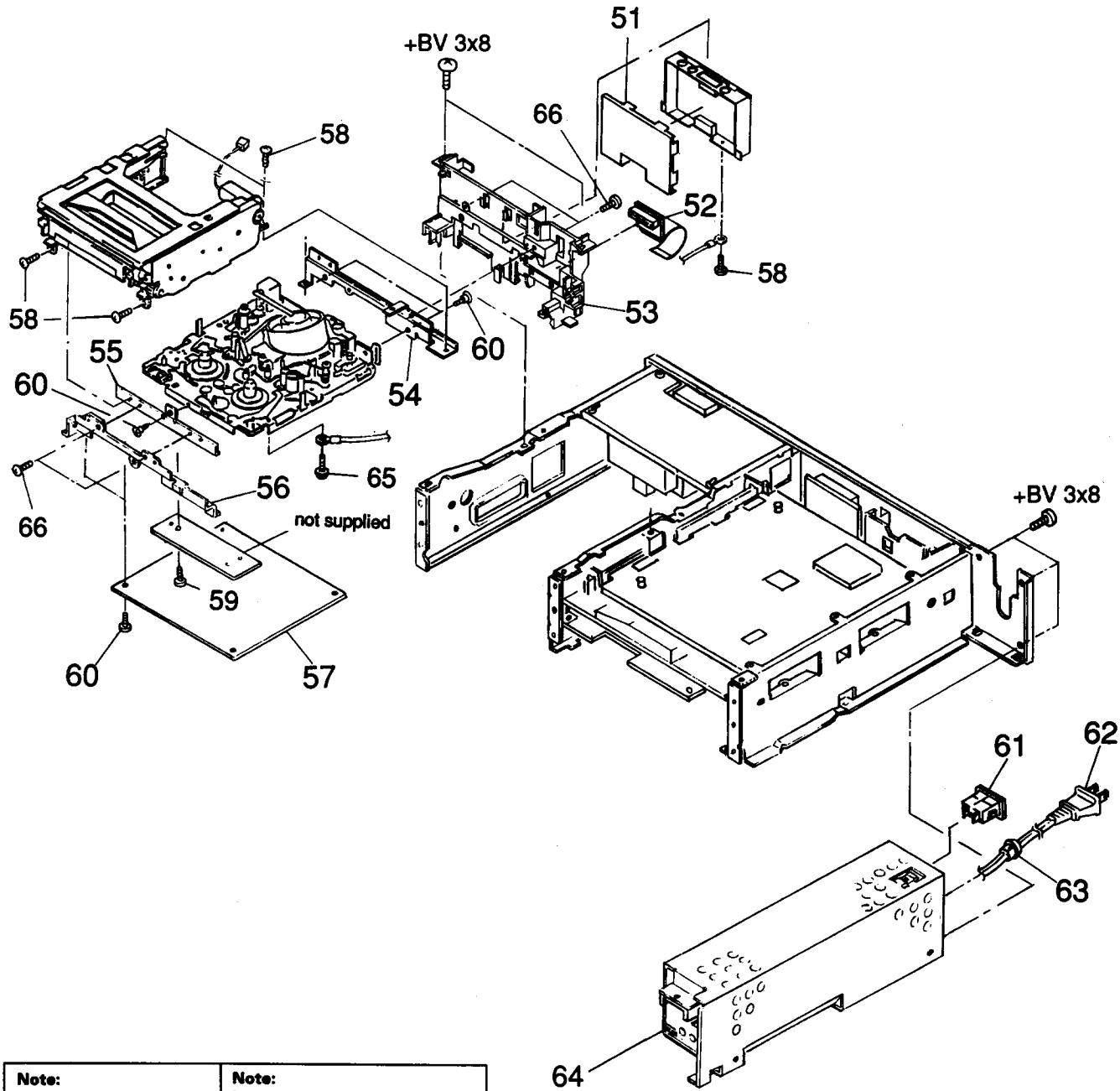
Les composants identifiés par une marque ⚠ sont critiques pour la sécurité.
Ne les remplacer que par une piéce portant le numéro spécifé.

6-1. CABINET ASSEMBLY



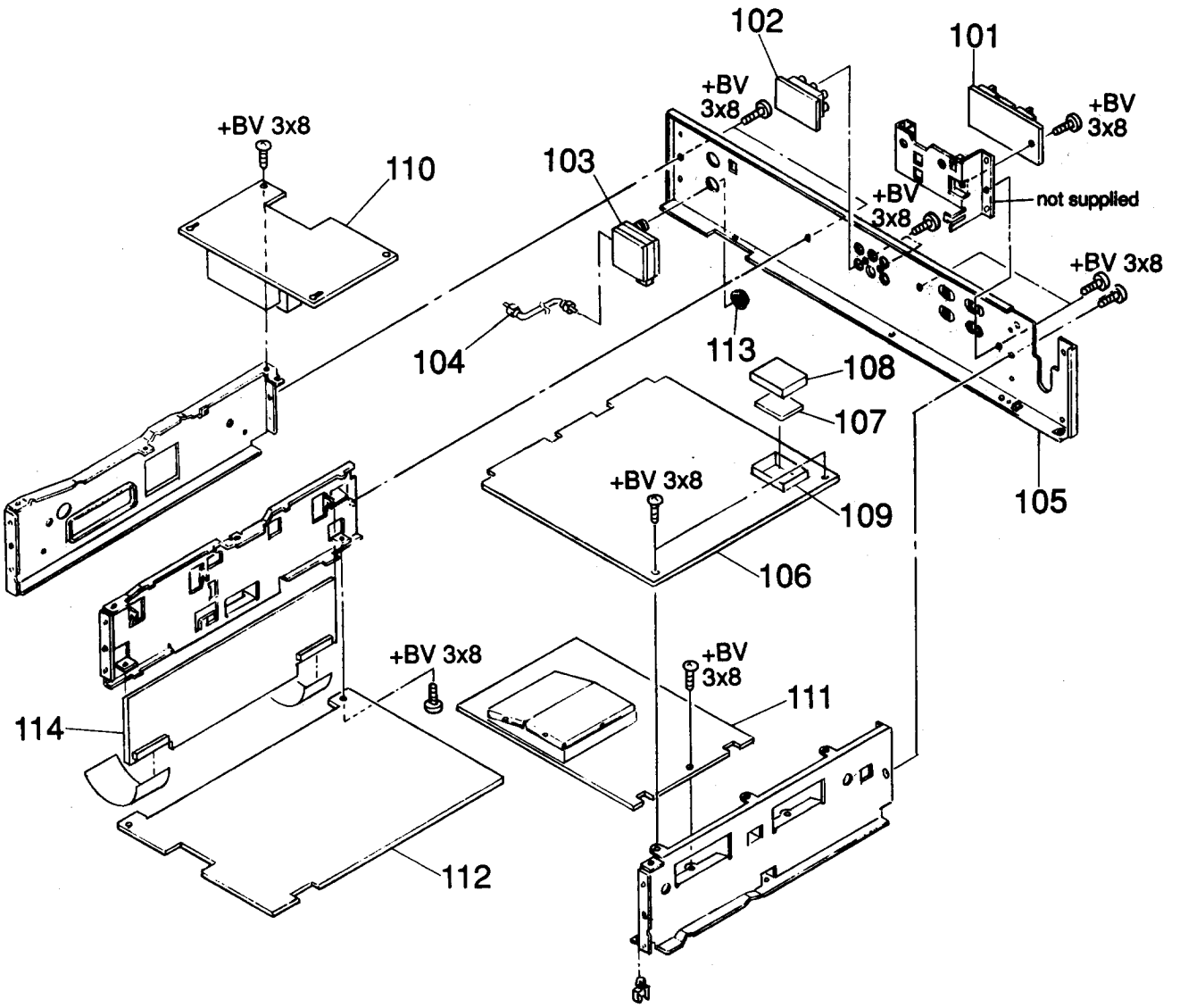
No.	Part No.	Description	Remark	No.	Part No.	Description	Remark

6-2. MAIN CHASSIS ASSEMBLY



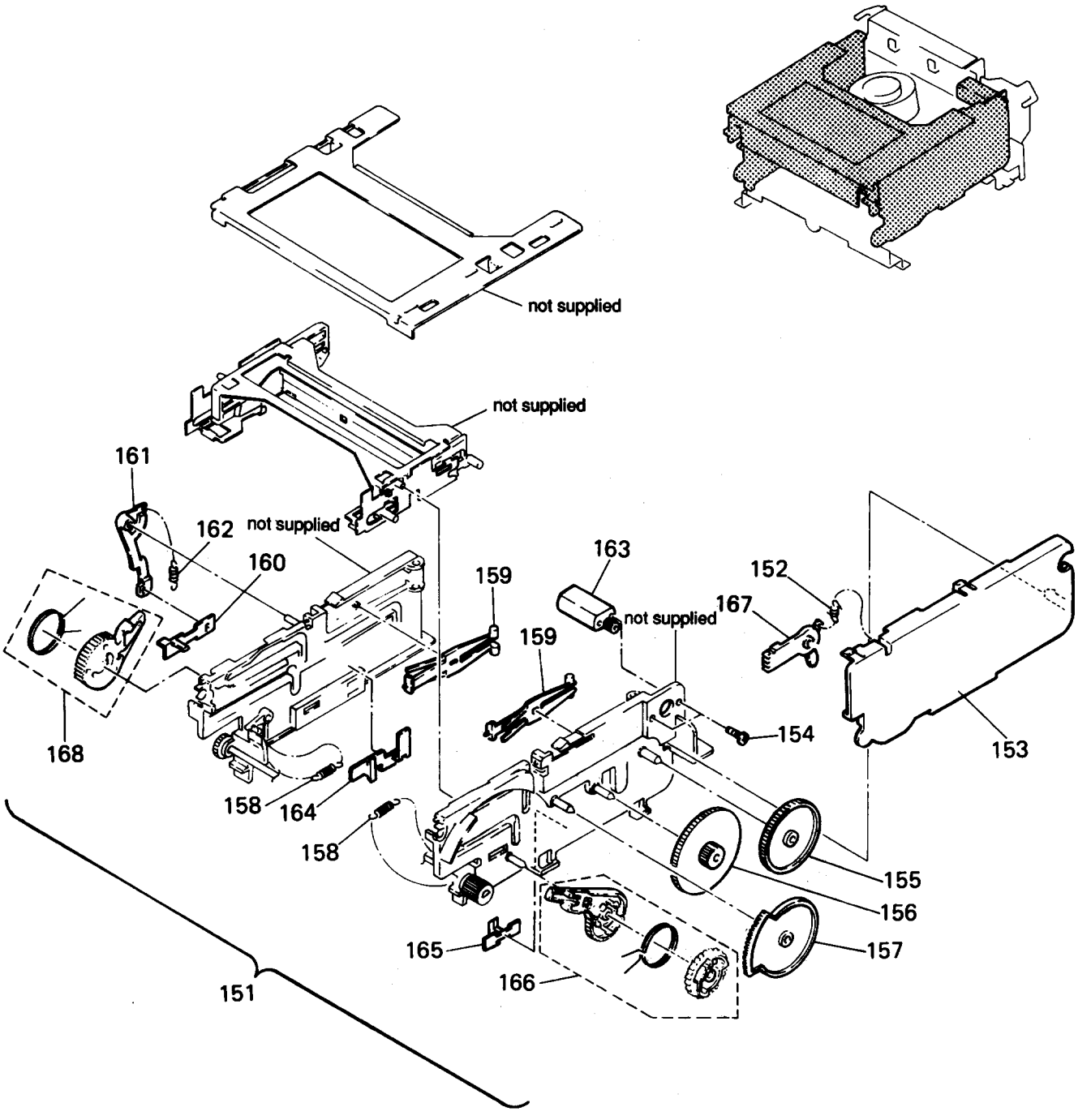
Note:	Note:
The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safetry. Replace only with part number specified.	Les composants identifiés par une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une piéce portant le numéro spécifié.

6-3. MAIN BOARD ASSEMBLY

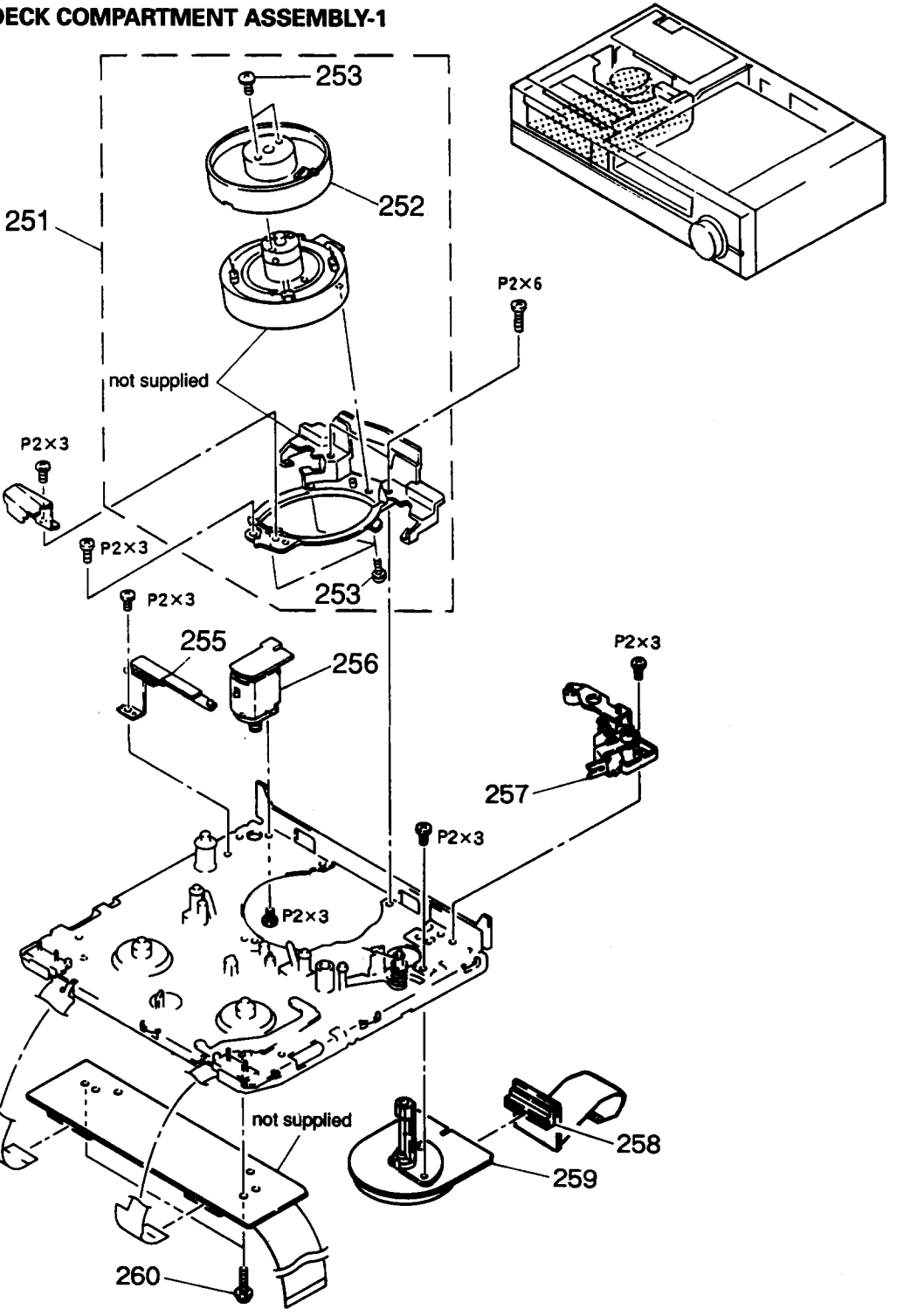


Note:	Note:
The components identified by mark ⚠ or dotted line with mark ⚠ are critical for safetry. Replace only with part number specified.	Les composants identifiés par une marque ⚠ sont critiques pour la sécurité. Ne les remplacer que par une piéce portant le numéro spécifié.

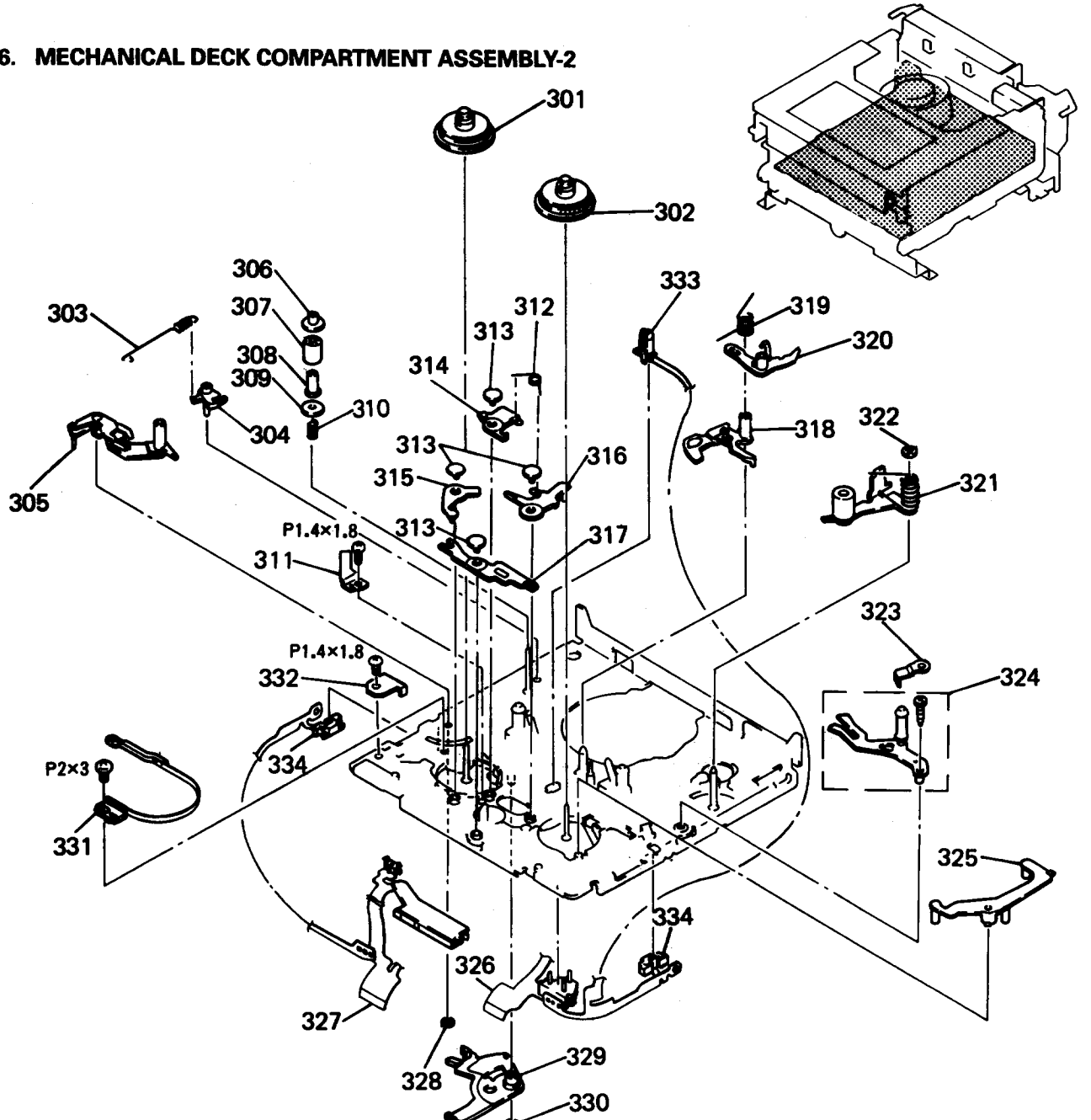
6-4. CASSETTE COMPARTMENT ASSEMBLY



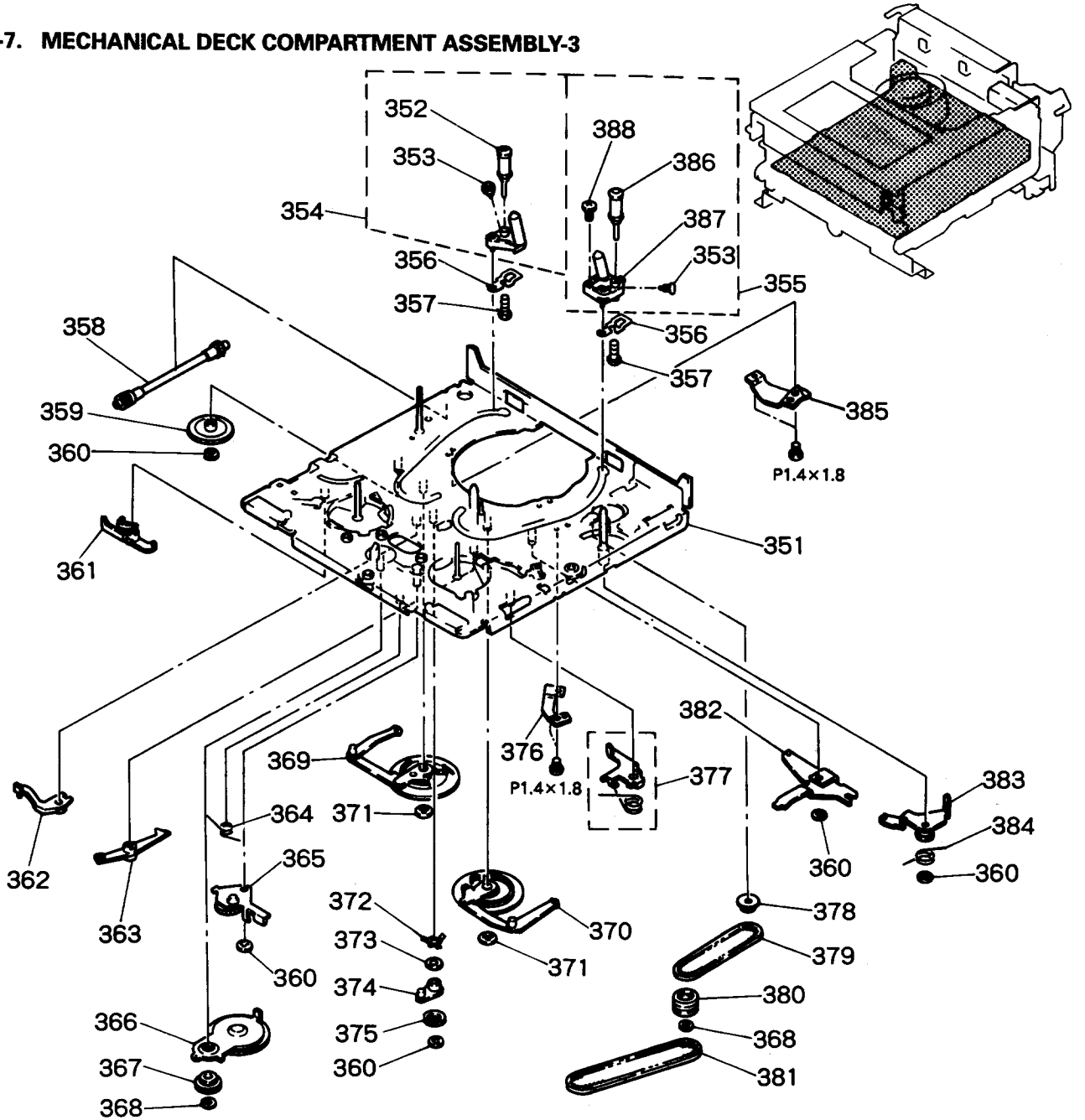
6-5. MECHANICAL DECK COMPARTMENT ASSEMBLY-1



6-6. MECHANICAL DECK COMPARTMENT ASSEMBLY-2



6-7. MECHANICAL DECK COMPARTMENT ASSEMBLY-3



SECTION 8
MECHANICAL ADJUSTMENT

HOW TO ADJUST MECHANICAL UNIT

For the adjustment and checking of the mechanical unit and methods for replacing camera parts, see the separate 8 mm Video Mechanical Unit Adjustment Guide III U Mechanism (9-972-732-11).
However, see the following for the setting of track shift mode.

8-1. TAPE PASSING ADJUSTMENT (TRACK SHIFT)

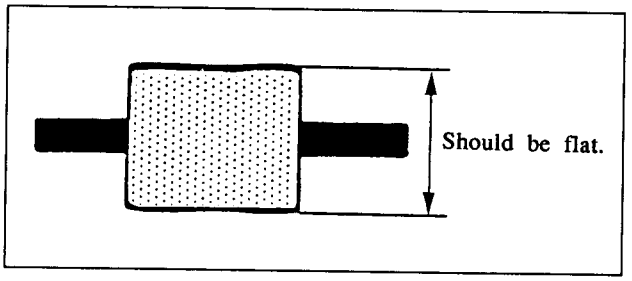
The 8 mm video system employs a ATF (automatic track finding) system with which tape running speed is instantaneously controlled and tracked at high accuracy based on four types of pilot signals. Thus, the tracking adjust knob is no longer required while realizing more precise tracing.
However, controlling of the tape pass system was rather difficult with the ATF system. This was because, even if tracing of the head was slightly deviated, the ATF could automatically compensate it, so complete adjustment was not possible.
To overcome such a trouble in finely adjusting to track, set up track shift mode and adjust it. Thus, the ATF is forcefully controlled to shift tracking quantity by a preset value (about 1/4). Therefore, fine adjustment of tracking can be operated easily. No tracking shift jig is required.

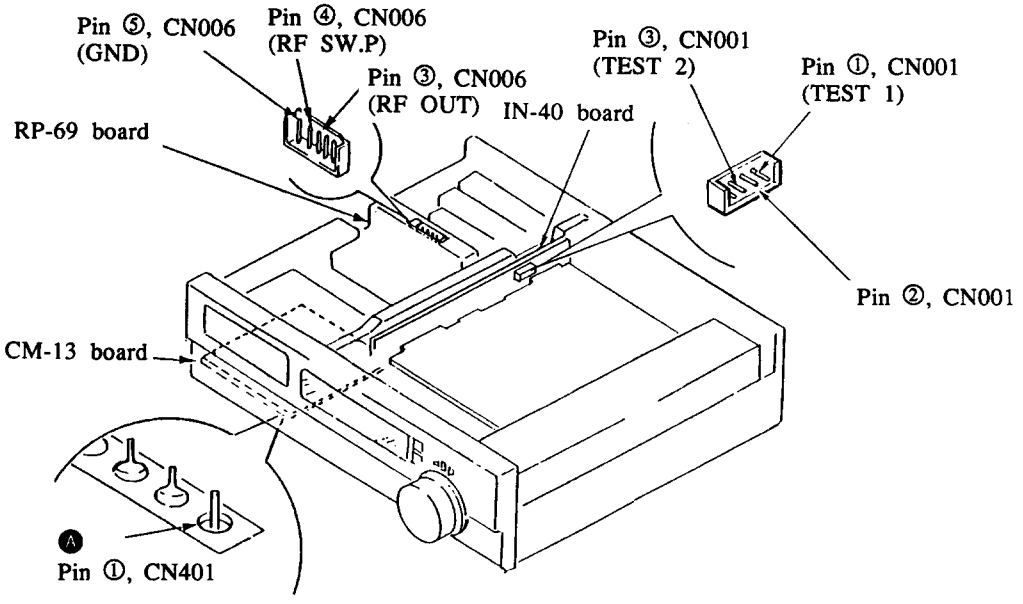
8-1-1. Setting of track shift mode

1) Remove the solder on Pin ① A of CM-13 board by ironing and evacuating, thus isolating the pin from the pattern and the land.
2) Connect Pin ②, CN001 on the IN-40 board to Pins ① and ③ of CN001 (Test 2).
3) Thus, track shift mode is actuated.

8-1-2. Adjustment preparation

1) Clean the tape running surface (tape guide, drum, capstan shaft, pinch roller).
2) Connect to the oscilloscope.
   CH1: RP-69 board CN006 Pin ③ (PB RF)
   CH2: RP-69 board CN006 Pin ④ (RF.SWP)
3) Replay the alignment tape (WR5-1NP) for tracking.
4) Check that the RF waveforms of the oscilloscope at both input and output sides are flat. If not flat, adjust the mechanical unit according to the separate manual U mechanical unit adjustment.
5) After completion of adjusting, solder Part A of Pin ① in the CM-13 board.





SECTION 9
ELECTRICAL ADJUSTMENT

For adjusting, see the layout view of parts to be adjusted shown on Page 186 and subsequent ones.

9-1. PREPARATION OF ELECTRICAL ADJUSTMENT

The following instruments are used in electrical adjustment.

(Devices in Use)

1) Monitor TV
2) Oscilloscope of 2 channels with a bandwidth of 10MHz or more, provided with delay mode. (Use the 10:1 probe unless otherwise required.)
3) Frequency counter
4) Pattern generator (with video output terminal)
5) Digital voltmeter
6) Audio generator
7) Audio level meter
8) Audio distortion meter
9) Audio attenuator
10) Sound multiplexed signal generator
11) Noise meter
12) Alignment tape

For tracking adjustment (WR5-1NP)*1
Part code: 8-967-995-02

For video frequency characteristics adjustment (WR5-6N)*2
Part code: 8-967-995-12

For operation check (WR5-4NL)*3
Part code: 8-967-995-51

(WR5-5NSP)*4
Part code: 8-967-995-42

Note: *1: WR5-1N (8-967-995-01)
*2: WR5-2N (8-967-995-11)
*3: WR5-3NL (8-967-995-31)
*4: WR5-3NSP (8-967-995-22)
WR5-4NSP (8-967-995-41)
} These alignment tapes are also operable.

(Connection of Devices)

Connect measurement devices as follows for adjustment, unless otherwise required.

- Input select switch.....LINE position 1

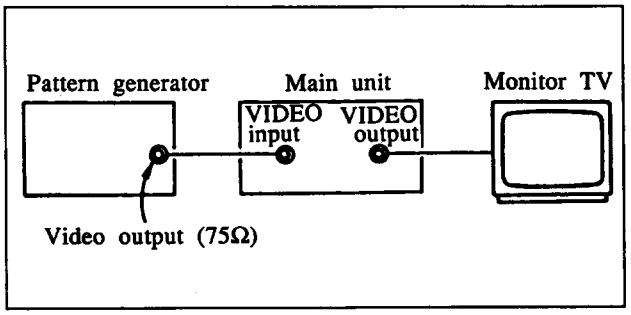


Fig. 9-1

(Setup in Adjustment)

Video signal transmitted from the NTSC pattern generator is used as an adjustment signal during electrical adjustment. Therefore, it is required that the video output signal satisfies the specifications.

Connect the oscilloscope onto the image input terminal and check that the amplitude of the synchronization signal of the video signal is about 0.3V, that the amplitude of image part is about 0.7V, that the amplitude of burst signal is about 0.3V and flat and that the level ratio of burst signal to "red" signal is 0.30:0.66.

Video signal (color bar) used for adjustment is shown in Fig. 9-2

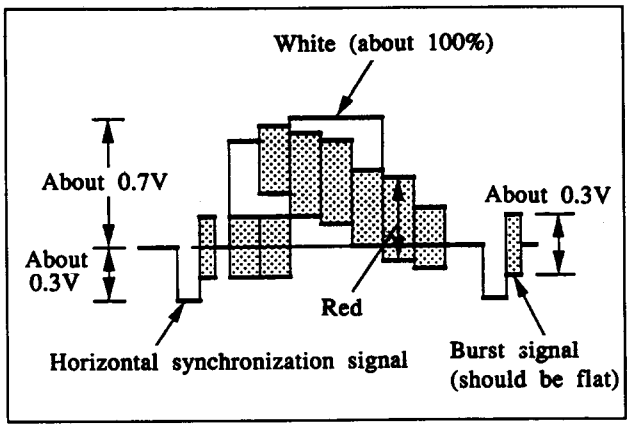


Fig. 9-2 Color bar signal of pattern generator

(Alignment Tape)

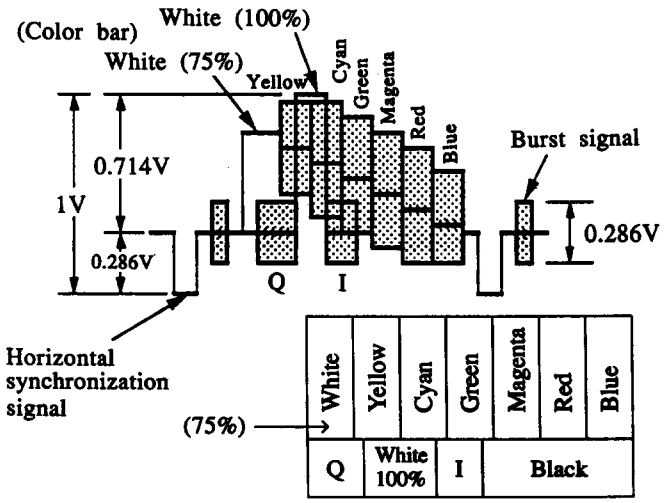
Name	Detail	Application
Tracking (WR5-1NP)	1. Recording area PCM ~ Video 2. Recorded detail CH2: Signal for 1MHz linearity adjustment Switching position adjusting marker (CH1: 9MHz)	Drum linearity adjustment
Video frequency characteristics (WR5-6N)	1. Recording area Video 2. Recording detail RF sweep 0~10MHz 3. Marker 1, 3.58, 5.5, 7MHz 4. Recording level $\frac{\text{5.5MHz level}}{\text{3.58MHz level}} = -5\text{dB}$	Frequency characteristics adjustment
Operation check SP mode (WR5-4NSP) LP mode (WR5-4NL) **Note:** WR5-4NL does not contain PCM area.	1. Recording area Video 2. Recording detail ■ Video area • Video signal Color bar 4minutes Monoscope 4minutes  • Audio signal (AFM) 400Hz 60% modulation ■ PCM area • Audio signal (PCM) 20Hz 20sec. 400Hz 20sec. } Monoscope part is repeated. 14kHz 20sec. 1kHz 4min Color bar part	Operation check

Table 9-1

(Output Levels and Impedances)

Image input Pin jack
Input signal: 1Vp-p, 75Ω unbalanced, negative synchronization

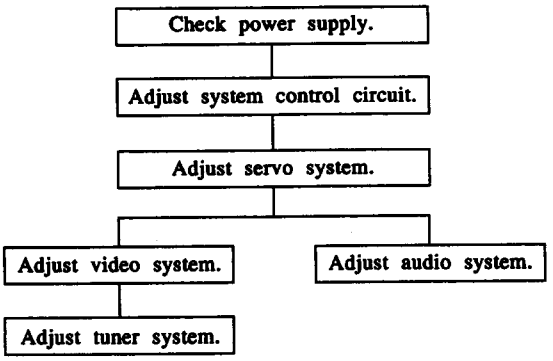
Image output Pin jack
Output signal: 1Vp-p, 75Ω unbalanced, negative synchronization

Sound input Pin jack
Input level: −10dBs (0dBs = 0.775Vrms)

Sound output Pin jack
Specified output: −10dBs (250mV)
Output impedance: 10kΩ or less

(Adjustment Procedures)

Adjust the unit in the following procedures.



9-2. CHECKING OF VOLTAGES IN POWER SUPPLY (POWER BLOCK BOARD)

Measure voltages in playback mode.

1. Check UN + 5.7V.
   Voltage at Pin ② of CN202 should be 5.7V ± 0.6Vdc with Pin ①, CN202 connected to the negative side.
2. Check UN – 30V.
   Voltage at Pin ④, CN202 should be –30V ±3Vdc.
3. Check DC OUT 7.4V.
   Voltage at Pins ① and ② of CN203 should be $+7.4V\ ^{+0.5}_{-0.4}Vdc$.
4. Check UN + 40V.
   Voltage at Pin ① of CN201 should be +40V ±2Vdc.
5. Check SW + 12V.
   Voltage at Pin ② of CN201 should be +12V ±0.5Vdc.
6. Check SW + 9V.
   Voltage at Pin ③ of CN201 should be +9V ±0.3Vdc.
7. Check UN + 9V.
   Voltage at Pin ④ of CN201 should be $+9.7V\ ^{-0.3}_{-0.2}Vdc$.
8. Check UN SW + 5.7V.
   Voltage at Pin ⑥ of CN201 should be +5.7V ±0.2Vdc.
9. Check SW + 5V.
   Voltage at Pins ⑦ and ⑧ of CN201 should be +5V ±0.2Vdc.
10. Check UN SW – 5V.
    Voltage at Pin ⑨ of CN201 should be –5V ±0.3Vdc.
11. Check SW – 5V.
    Voltage at Pin ⑩ of CN201 should be –5V ±0.3Vdc.

9-3. ADJUSTMENT OF SYSTEM CONTROL CIRCUIT

9-3-1. Micon oscillator (8MHz) (FR-60 board)

Signal	Free
Measurement point	Pin ⑭, IC005
Instrument	Frequency counter
Specified value	8,050 ± 100kHz

(Check Methods)

1) Check for 8,050 ± 100kHz.

9-3-2. Checking of tuner and timer micon oscillator (32kHz) (FR-60 board)

Mode	EE
Signal	Free
Measurement point	Pin ⑧ IC005 (BUZZER OUT)
Instrument	Frequency counter
Adjustment element	CT001
Specified value	4,096 ± 0.015Hz *Note

(Check Methods)

1) Adjust the frequency at Pin ⑧, IC005 to 4,096 ± 0.015Hz using CT001.

*** Note:** The frequency of 32kHz is divided in the IC.

9-3-3. Checking of mode control micon oscillator (ST-41 board)

Mode	EE
Signal	Free
Measurement point	Pin ⑤, IC001
Instrument	Frequency counter
Specified value	4.00 ± 0.04MHz

(Check Methods)

1) Check for 4.00 ± 0.04MHz.

9-4. ADJUSTMENT OF SERVO SYSTEM

9-4-1. Adjustment of oscillation frequency (CM-13 board)

Mode	Record
Signal	Free
Measurement point	Pin ⑦, IC502
Instrument	Frequency counter
Adjustment element	RV501
Specified value	479.89 ± 5.0kHz

(Adjustment Methods)

1) Set oscillation frequency to 479.89 ± 5.0kHz using RV501.

9-4-2. Switching position adjustment (CM-13 board)

Mode	Playback
Signal	Alignment tape: For operation check (WR5-4NSP)
Measurement points	CH-1: Pin ③, IC201 (VIDEO OUT) CH-2: Pin ⑩, IC401 (RF SWP)
Instrument	Oscilloscope
Adjustment element	RV401
Specified value	6.5 ± 0.3H (410 ± 20μsec)

(Adjustment Methods)

1) Connect Pins ② and ③ of CN001 in the IN-40 board (test 2 MODE)
2) Establish the specified value of 6.5 ± 0.3H (410 ± 20μsec) using RV401.

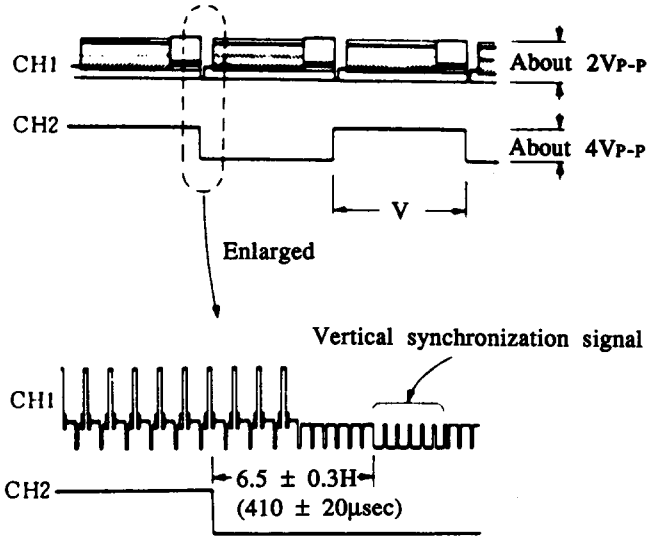


Fig. 9-3 Adjustment of switching position.

9-4-3. Adjustment of capstan FG (CM-13 board)

Mode	Record (LP mode)
Signal	Free
Measurement point	Pin ①, IC501
Instrument	Oscilloscope
Adjustment element	RV201
Specified value	0.3VP-P or less

(Adjustment Methods)

1) Minimize the amplitude of the output waveform (capstan error) at Pin ① of IC501, using RV201.

Fig. 9-4 Adjustment of capstan FG

9-4-4. Adjustment of PB SP/LP (CM-13 board)

Mode	Variable speed playback (CUE)
Signal	Alignment tape: For operation check (SP mode: WR5-4NSP) (LP mode: WR5-4NL)
Measurement point	Pins ② and ③, IC302
Instrument	digital voltmeter
Adjustment element	RV301
Specified value	$\frac{(Vs + VL)}{2}$

(Adjustment Methods)

1) Set S110 (SP/LP) to LP and playback the tape for SP mode (WR5-4NSP) in CUE mode.
2) Measure the voltage at Pin ② of IC301 at that time, using the digital voltmeter and store. (Vs)
3) Set S110 (SP/LP) to SP and playback the tape for LP mode (WR5-4NL) in CUE mode.
4) Measure the voltage at Pin ③ of IC201 at that time, using the digital voltmeter and store. (VL)
5) Adjust RV301 so that voltages at Pins ② and ③ of IC302 are $\frac{(Vs + VL)}{2}$.

9-5. ADJUSTMENT OF VIDEO SYSTEM

Adjust the video system generally according to the following procedures.
Color video signal supplied by the pattern generator is used as the video input signal for adjusting the video system in recording mode. Check that synchronization signal and color burst signal satisfy the specifications assigned upon setting up for the adjustment of Fig. 9-2.

(Adjustment Procedures)

1. Adjust playback frequency characteristics.
2. Check flying erase.
3. Check fo of the crystal oscillator.
4. Adjust Y/C separation.
5. Adjust burst flag
6. Adjust SYNC AGC.
7. Adjust Y FM carrier frequency.
8. Adjust Y FM deviation.
9. Adjust emphasis input.
10. Check AC clip.
11. Adjust chroma emphasis fo.
12. Adjust REC Y recording current.
13. Adjust REC C level.
14. Adjust PB CCD input level.
15. Adjust REC ATF level.
16. Adjust PB Y level.
17. Adjust CCD JOG playback level.

9-5-1. Adjustment of playback frequency characteristics (RP-69 board)

1. Adjustment of CH1 and CH2

The adjustment element for CH2 is shown in ( ).

Mode	Playback
Signal	Alignment tape: For adjusting frequency characteristics (WR5-6N)
Measurement point	Pin ③, CN006 External trigger: Pin ④, CN104 Trigger slope: – (+)
Instrument	Oscilloscope
Adjustment element	RV004 (RV003)
Specified value	3.5MHz level: 5.5MHz level = 4:2.5 (63 ± 4%)

(Adjustment Methods)

1) Adjust RV004 and RV003 so that the ration of 5.5MHz level to that of 3.58MHz becomes 4:2.5 (63 ± 4%).

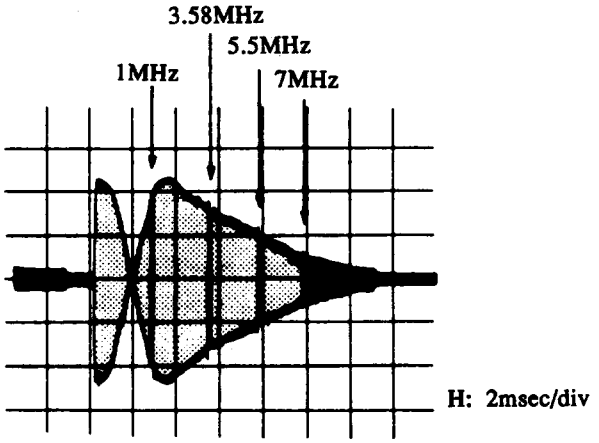


Fig. 9-5 Adjustment of playback frequency characteristics

2. Adjustment of CH1'

Mode	Playback pause
Signal	Alignment tape: For adjusting frequency characteristics (WR5-6N)
Measurement point	Pin ①, CN006 External trigger: Pin ④, CN104 Trigger slope: +
Instrument	Oscilloscope
Adjustment element	RV201
Specified value	Ratio of 3.58MHz level to that of 5.5MHz is 4:2.5 (63 ± 4%).

(Adjustment Methods)

1) Connect pins ② and ③ of CN001 in the IN-40 board. (Test 2 MODE)
2) Adjust RV201 so that the ratio of 5.5MHz level to that 3.58MHz becomes 4:2.5 (63 ± 4%).

9-5-2. Checking of flying erase (RP-69 board)

Mode	Record
Signal	Free
Measurement point	Pin ②, CN001
Instrument	Frequency counter
Specified value	8.3 ± 0.5MHz
Instrument	Oscilloscope
Specified value	About 5VP-P

Note: 1) Use the tape of MP type.
2) Connect the frequency counter via a buffer amplifier (oscilloscope, etc.) with a high input impedance (1MΩ or more) and low capacitance (10pF or less).

(Check Methods)

1) Check for 8.3 ± 0.5MHz and about 5.0VP-P.

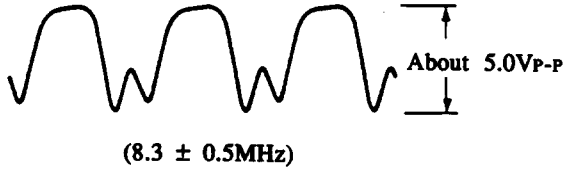


Fig. 9-6 Checking of flying erase

9-5-3. Checking of fo of crystal oscillator (VI-96 board)

Mode	Playback
Signal	Alignment tape: For operation check (WR5-4NSP)
Measurement point	Pin ⑲, IC001
Instrument	Frequency counter
Specified value	3579545 ± 150Hz

Note: Connect the frequency counter via a buffer of high impedance (about 10MΩ) and low capacitance (10pF or less).

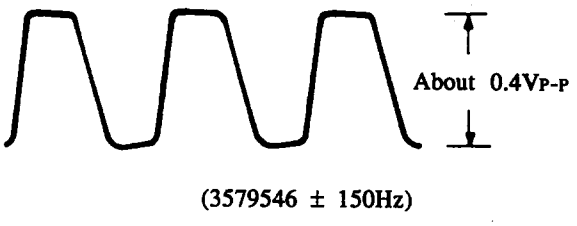


Fig. 9-7 Checking of crystal oscillator fo

9-5-4. Adjustment of Y/C separation (VI-96 board)

Mode	EE
Signal	Color bar
Measurement point	Pin ㉓, IC001
Instrument	Oscilloscope
Adjustment element	RV107
Specified value	150mVP-P or less (residual chroma component)

(Connection)

1) Connect an electrolytic capacitor of 10μF/16V between Pin ㉔ of IC001 and GND.

(Adjustment Methods)

1) Minimize residual chroma component (red parts) by adjusting RV107. (150mVP-P or less)

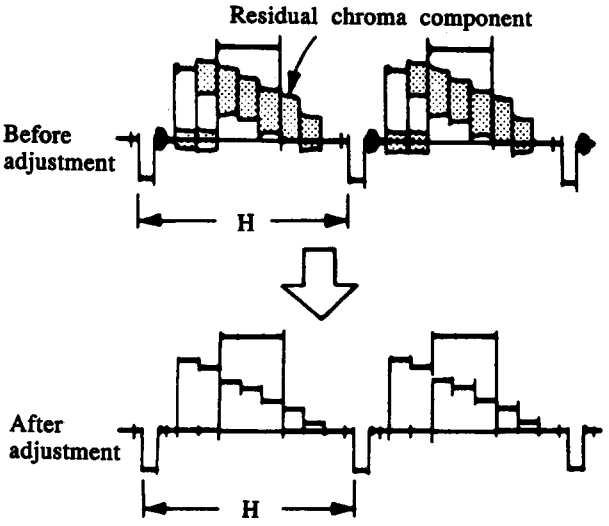


Fig. 9-8 Y/C separation adjustment

9-5-5. Adjustment of burst flag (VI-96 board)

Mode	EE
Signal	Color bar
Measurement point	CH1: Pin ⑤, IC001 (REC C RF OUT) CH2: Pin ⑧, IC001 (BF OUT)
Instrument	Oscilloscope
Adjustment element	RV106
Specified value	T = 7.1 ± 0.1μsec (See Fig. 9-9.)

(Connection)

1) Connect a resistance of 1kΩ across Pin ⑧ of IC001 and GND.

(Adjustment Methods)

1) Adjust RV106 so that the fall (⅂) of CH2 burst pulse coincides with the center of CH1 burst signal. (See Fig. 9-9.)

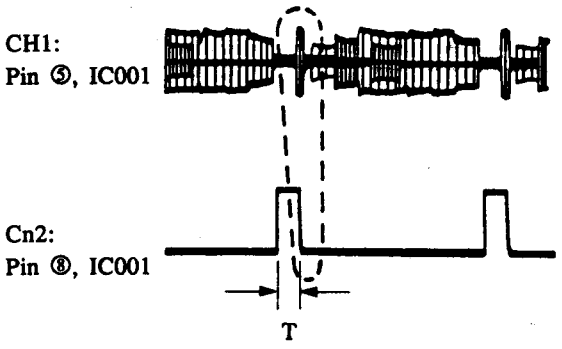


Fig. 9-9 Burst flag

9-5-6. Adjustment of SYNC AGC (VI-96 board)

Mode	EE
Signal	color bar
Measurement point	Pin ㊾, IC001
Instrument	Oscilloscope
Adjustment element	RV201
Specified value	0.5 ± 0.02Vp-p

Note: The video out terminal (CNJ701 of Board RJ-20) should be terminated with a 75Ω resistance.

(Adjustment Methods)

1) Adjust RV201 for 0.5 ± 0.02Vp-p.

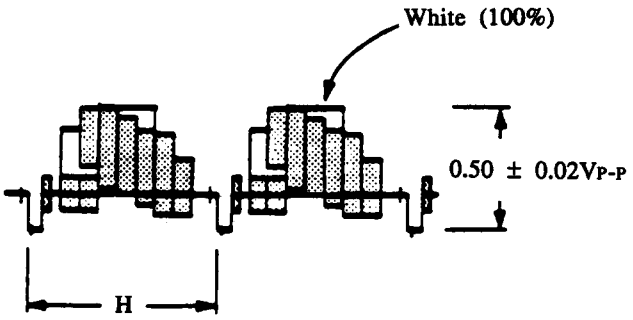


Fig. 9-10 Adjustment of SYNC AGC

9-5-7. Adjustment of PB Y level (VI-96 board)

Mode	Playback
Signal	Enter RF signal modulated from the color bar, onto Pin ⑥, CN003. (500mVp-p)
Measurement point	Pin ③, CN006
Instrument	Oscilloscope
Adjustment element	RV802
Specified value	1.00 ± 0.05Vp-p

Note: The VIDEO OUT terminal (CNJ701 of Board RJ-20) should be terminated with a 75Ω resistance.

(Adjustment Methods)

1) Adjust RV802 for 1.00 ± 0.05Vp-p.

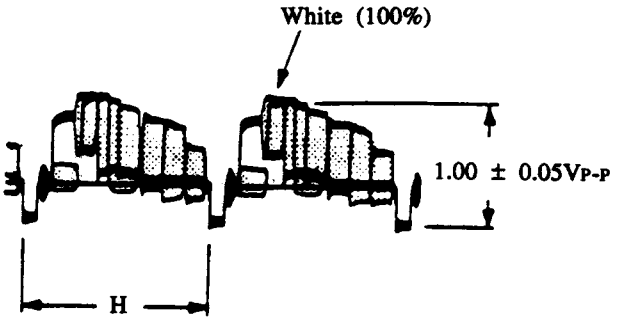


Fig. 9-11 Adjustment of PB Y level

9-5-8. Adjustment of Y FM carrier frequency (VI-96 board)

Mode	EE
Signal	No signal
Measurement point	Pin ⑲, IC001
Instrument	Frequency counter
Adjustment element	RV103
Specified value	4.38 ± 0.02MHz

(Adjustment Methods)

1) Adjust RV103 for 4.38 ± 0.02MHz.
2) After completion of adjusting, adjust "Y FM deviation" and "emphasis input level."

Fig. 9-12 Adjustment of Y FM carrier frequency

9-5-9. Adjustment of Y FM deviation (VI-96 board)

Mode	EE
Signal	Color bar
Measurement point	Pin ③, CN006 (LINE OUT 1V)
Instrument	Oscilloscope
Adjustment element	RV102
Specified value	Playback level is 1.00 ± 0.05Vp-p.

Note: 1) Adjustment of "PB Y level" and "Y FM carrier frequency" should be completed beforehand.
2) The VIDEO OUT terminal (CNJ701 of Board RJ-20) should be terminated with a 75Ω resistance.

(Adjustment Methods)

1) Record color bar signal
2) Playback recorded level.
3) Check playback output level.
Specification: 1.00 ± 0.05Vp-p
4) If the specification is not satisfied, rotate RV102 as follows and repeat 1) ~ 3).

	Direction of revolution when viewed from pattern surface side of RV102.
Larger than specified value	Clockwise (↻)
Smaller than specified value	Counterclockwise (↺)

Table 9-2

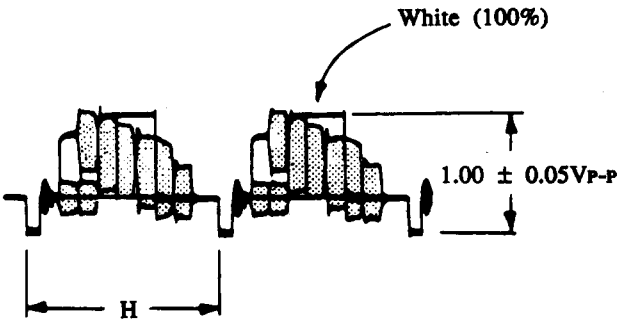


Fig. 9-13 Adjustment of Y FM deviation

9-5-10. Adjustment of emphasis input (VI-96 board)

Mode	EE
Signal	Color bar
Measurement point	Pin ⑲, IC001
Instrument	Oscilloscope
Adjustment element	RV105
Specified value	0.5 ± 0.02Vp-p

(Adjustment Methods)

1) Adjust RV105 for 0.50 ± 0.02Vp-p.

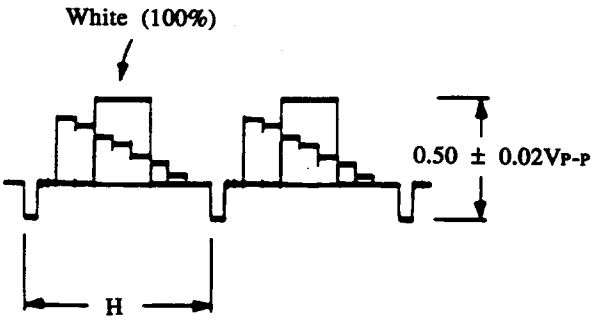


Fig. 9-14 Adjustment of emphasis input level

9-5-11. Checking of AC clip (VI-96 board)

Mode	EE
Signal	Color bar
Measurement point	Pin ㉕, IC001
Instrument	Oscilloscope
Specified value	$\frac{B}{A} \times 100 = 240 \pm 10\%$

Note: To measure with the oscilloscope, effect the band limit of 20MHz.

(Check Methods)

1) Check that the output waveform at Pin ㉕ of IC001 is $\frac{B}{A} \times 100 = 240 \pm 10\%$.

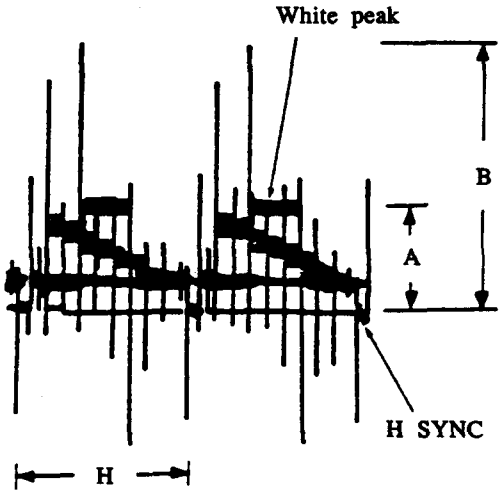


Fig. 9-15 Checking of AC clip

9-5-12. Adjustment of chroma emphasis fo (VI-96 board)

Mode	EE
Signal	Color bar
Measurement point	Pin ㉕, IC001
Instrument	Oscilloscope
Adjustment element	FL002
Specified value	Minimum fo component

(Adjustment Methods)

1) Adjust FL002 to minimize the amplitude in the flat part of chroma signal to a minimum lower than 550mVP-P.

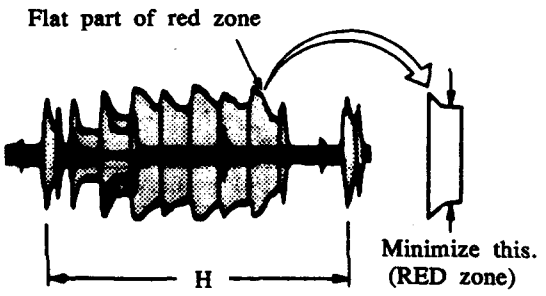


Fig. 9-16 Adjustment of chroma emphasis fo

9-5-13. Adjustment of REC Y level (VI-96 board)

Mode	EE
Signal	No signal
Measurement point	Pin ②, CN003 (See Fig. 9-16.)
Instrument	Oscilloscope
Adjustment element	RV501
Specified value	0.28 ± 0.01VP-P

(Connection)

1) Connect the following circuit onto Pin ②, CN003 and measure voltage at Point Ⓐ. Output signal is 4.2MHz CW.

(Adjustment Methods)

1) Adjust RV501 for 0.28 ± 0.1VP-P.

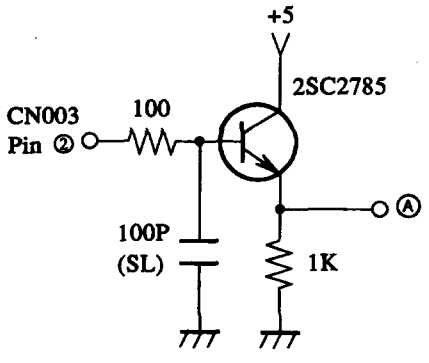


Fig. 9-17 Connection for measurement

9-5-14. Adjustment of REC C level (VI-96 board)

Mode	EE
Signal	Color bar
Measurement point	Pin ③, CN003
Instrument	Oscilloscope
Adjustment element	RV502
Specified value	180 ± 10mVP-P

Note: 1) After completion of adjusting REC C level, be sure to check REC AFM level and REC ATF level.
2) Use the tape of MP type.

(Adjustment Methods)

1) Adjust RV502 for 180 ± 10mV.

Fig. 9-18 Adjustment of REC C level

9-5-15. Adjustment of PB CCD input level (VI-96 board)

Mode	Playback
Signal	Enter RF signal modulated from color bar, onto Pin ⑥, CN003. (500mVP-P)
Measurement point	Pin ㊼ IC001
Instrument	Oscilloscope
Adjustment element	RV101
Specified value	0.5 ± 0.02VP-P

(Adjustment Methods)

1) Adjust RV101 so that level from SYNC TIP of inverted signal to white peak at 0.5 ± 0.02VP-P.

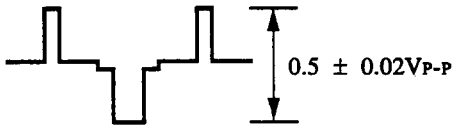


Fig. 9-19

9-5-16. Checking of REC ATF level (CM-13 board)

Mode	REC
Signal	No signal
Measurement point	Pin ⑧, CN401
Instrument	Oscilloscope
Specified value	See the following.

Note: Use the tape of MP type.

(Check Methods)

1) REC ATF level shall be as follows.

	f1	f2	f3	f4
IC401 ② SEL1	H	L	H	L
IC401 ① SEL2	H	H	L	L

f1 = 360 ± 40mVP-P, 102.5 ± 0.1kHz
f2 = 340 ± 40mVP-P, 118.9 ± 0.1kHz
f3 = 300 ± 30mVP-P, 165.2 ± 0.1kHz
f4 = 260 ± 30mVP-P, 148.7 ± 0.1kHz

9-5-17. Adjustment of CCD JOG playback level (VI-96 board)

Mode	Playback pause (SP mode)
Signal	Enter RF signal modulated from color bar, onto Pin ⑥, CN003. (500mVP-P)
Measurement point	Pin ③, CN006
Instrument	Oscilloscope
Adjustment element	RV801
Specified value	1.00 ± 0.05VP-P

Note: The VIDEO OUT terminal (CNJ701 of Board RJ-20) should be terminated with a 75Ω resistance.

(Adjustment Methods)

1) Check the level of video signal in playback mode. (1.00 ± 0.05VP-P)
2) Set playback pause mode.
3) Adjust RV801 so that the level of video signal is equal to that in playback.
4) Change the level of Pin ⑨, CN005 to "H" level and check that it is within ± 0.05VP-P to the adjustment value above.

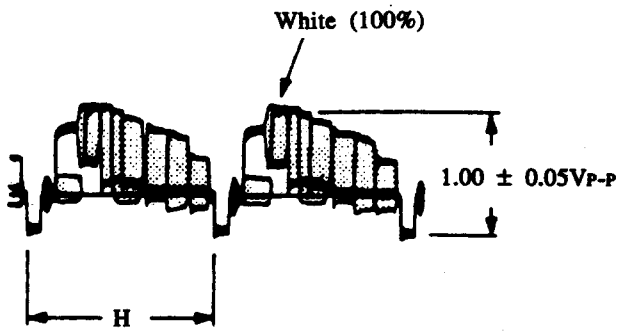


Fig. 9-20 Adjustment of CCD JOG playback level

9-6. ADJUSTMENT OF AUDIO SYSTEM

- Use the video signal input consisting of color bar signal for adjustment.

(Connection of Audio Measurement Devices)

Connect the following audio system measurement devices in addition to video system measurement instruments.

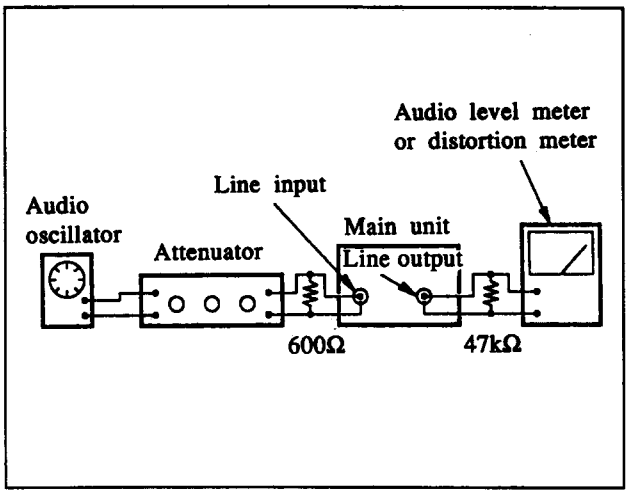


Fig. 9-21

(Adjustment Procedures)

1. Adjust the oscillation frequency of PCM master clock.
2. Adjust the frequency of PCM playback VCO free oscillation.
3. Adjust PCM Playback level.
4. Check the E-E output level of Line 1.
5. Check the E-E output level of Line 2.
6. Adjust PCM offset.
7. Adjust PCM recording level.
8. Check overall frequency characteristics.
9. Check overall distortion rate.
10. Check overall noise level.

9-6-1. Adjustment of PCM audio system

Set switches and control knobs of VTR as follows for adjustment, unless otherwise required.

- Input select button .....LINE 1/2
- Sound monitor (PCM/Mix/Standard) switch .....PCM

Note: Adjustment element for channel R is shown in ( ).

1. Adjustment of PCM master clock (PC-50 board)

Mode	Record
Signal	No signal
Measurement point	Pin ㉘, IC703
Instrument	Frequency counter
Adjustment element	CV701
Specified value	11.58 ± 0.05MHz

(Adjustment Methods)

1) Connect Pin ㉘ of IC703 to SW 5V.
2) Connect Pin ㉗ of IC703 to GND.
3) Short pins ㉘ and ㉗ of IC703.
4) Adjust CV701 for 11.58 ± 0.05MHz.
5) After completion of adjusting, open each connection of IC703.

2. Adjustment of PCM playback VCO free oscillation frequency (PC-50 board)

Mode	Playback
Signal	Free tape
Measurement point	Pin ⑧, IC708 (FMCK)
Instrument	Frequency counter
Adjustment element	RV707
Specified value	11.58 ± 0.05MHz

(Adjustment Methods)

1) Connect Pin ① of IC708 to +5V.
2) Set playback mode.
3) Adjust RV602 for 11.58 ± 0.05MHz.
4) Open the connection of Pin ① of IC708.

3. Adjustment of PCM playback level (PC-50 board)

Mode	Playback
Signal	For checking alignment tape operation (WR5-4NSP) 400Hz zone
Measurement point	Sound output L and R (Load resistance 47kΩ)
Instrument	Audio level meter
Adjustment element	RV705
Specified value	–7.5 ± 0.3dBs

(Adjustment Methods)

1) Adjust RV705 for –7.5 ± 0.3dBs.

Note: Where there is a level difference of 1.5dBs or more between channels L and R, adjust the level to the center value.

4. Checking of line 1 E-E output level

Mode	EE
Signal	400Hz, –7.5dBs: Line 1 input L (R)
Measurement point	Line 1 output L (R) (Terminated with 47kΩ)
Instrument	Audio level meter
Specified value	–7.5dBs ± 2dBs

(Check Methods)

1) Slide the recording volume knob and check that the level of Line 1 output L (R) becomes –7.5dBs around center click.

5. Checking of line 2 E-E output level

Mode	EE
Signal	400Hz, –7.5dBs: Line 2 input L (R)
Measurement point	Line 2 output L (R) (terminated with 47kΩ)
Instrument	Audio level meter
Specified value	–7.5dBs ± 2dBs

(Check Methods)

1) Slide the recording volume knob and check that the level of Line 2 output L (R) becomes –7.5dBs around center click.

6. Adjustment of PCM offset (PC-50 board)

Mode	Record
Signal	No signal
Measurement point	Pin ㉗ (CH2), Pin ㉘ (CH1), IC701
Instrument	Oscilloscope (CH2 Trigger)
Adjustment element	RV701 (RV702)
Specified value	Illuminances of upper and lower bright lines should be the same.

Note: Channels L and R affect each other, so alternately adjust each channel.

(Adjustment Methods)

1) Adjust RV701 (RV702) for the same illuminances of upper and lower bright lines.

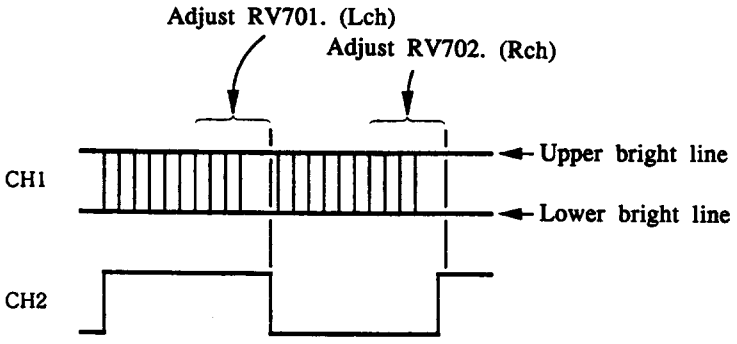


Fig. 9-22 Adjustment of PCM offset.

7. Adjustment of PCM recording level (PC-50 board)

Mode	Record
Signal	400Hz, –7.5dBs Sound input (L and R)
Measurement point	Sound output L (R)
Instrument	Audio level meter
Adjustment element	RV703
Specified value	–7.5 ± 0.5dBs

Note: "Adjustment of PCM Playback Level" should be already finished.

(Adjustment Methods)

1) Adjust the recording controls (for the left and right channels) until the line output is within –7.5 ± 0.5dBs.
2) Record the signal, then play it back.
3) Adjust RV703 until the left-channel playback level is within –7.5 ± 0.5dBs, then repeat recording.
4) Make sure that the right-channel output is within 1.5 dB with respect to the left-channel output.

8. Checking of overall frequency characteristics

Mode	Repeated self recording (LP mode)
Signal	Ⓐ 400Hz, –17.5dBs Ⓑ 20Hz, –17.5dBs Ⓒ 14kHz, –17.5dBs Line 1 input L (R)
Measurement point	Line 1 output L (R)
Instrument	Audio level meter
Specified values	Assuming 0dB of 400Hz Playback output level, 20Hz Playback output level is 0^{+2}_{-4}dB while 14kHz Playback level being 0^{+2}_{-5}dB.

(Check Methods)

1) Record signals Ⓐ ~ Ⓒ sequentially.
2) Playback recorded parts.
3) Check that, assuming 0dB of 400Hz playback output level, 20Hz and 14kHz playback output levels are 0^{+2}_{-4} dB and 0^{+2}_{-5} dB, respectively.

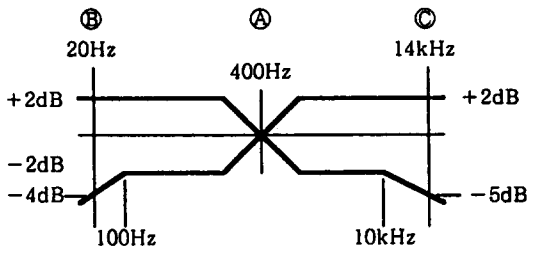


Fig. 9-23 Checking of overall frequency characteristics

9. Checking of overall distortion rate

Mode	Repeated self recording (LP mode)
Signal	1kHz, –7.5dBs: Line 1 input L (R)
Measurement point	Line 1 output L (R)
Instrument	Distortion meter
Specified value	0.7% or less

(Check Methods)

1) Record the signal.
2) Playback recorded part.
3) Distortion rate should be 0.7% or less.

10. Checking of overall noise level

Mode	Repeated self recording (LP mode)
Signal	No signal Insert the 600Ω shorting plug into both input L and R terminals of Line 1.
Measurement point	Line 1 output L (R)
Instrument	Noise meter
Specified value	64dB or above *

(Check Methods)

1) Record the signal.
2) Playback recorded part.
3) Difference between noise level and checked value of Line 1 E-E output level should be 64dB or more (IHF-A). *

* With IHF-A listening compensation filter in use

9-6-2. Adjustment of AFM audio system

Set switches and control knobs, etc. of VTR to the following places during adjustment, unless otherwise required.

Input select switch .....LINE 1/2
Sound monitor (PCM/Mix/Standard) Switch .....Standard

(Adjustment Procedures)

1) Adjust AFM carrier frequency (1.5MHz)
2) Adjust AFM carrier frequency (1.7MHz).
3) Adjust AFM deviation (1.5MHz).
4) Check E-E output level.
5) Check overall level characteristics.
6) Check overall frequency characteristics.
7) Check overall distortion rate.
8) Check overall noise level.

1. Adjustment of AFM carrier frequency (1.5MHz) (PC-50 board)

Mode	Record (SP mode)
Signal	No signal
Measurement point	Pin ⑬, IC901
Instrument	Frequency counter
Adjustment element	RV901
Specified value	1500 ± 3kHz

(Adjustment Methods)

1) Pull up Pin ㉕ of IC401 to +5V using 1kΩ.
2) Adjust RV901 for 1500 ± 3kHz.
3) After completion of adjusting, reset pull-up of IC401.

2. Adjustment of AFM carrier frequency (1.7MHz) (PC-50 board)

Mode	Record (SP mode)
Signal	No signal
Measurement point	Pin ⑬, IC801 (VCO OUT)
Instrument	Frequency counter
Adjustment element	RV801
Specified value	1700 ± 3kHz

(Adjustment Methods)

1) Pull up Pin ㉕ of IC401 using 1kΩ.
2) Adjust RV801 for 1700 ± 3kHz.
3) After completion of adjusting, reset pull-up of IC501.

3. Adjustment of AFM deviation (1.5MHz) (PC-50 board)

Mode	Record, stereo mode
Signal	Enter 400Hz –7.5dBs into the line input of RJ-20 board
Measurement point	Pin ⑬, IC901
Instrument	Oscilloscope
Adjustment element	RV902
Specified value	±60 ±0.5kHzp-p

(Adjustment Methods)

1) Adjust RV902 for the output level of ±60 ±0.5kHzp-p.

4. Checking of E-E output level

Check items of channel R are shown in ( ).

Mode	EE
Signal	400Hz –7.5dBs: Sound input (both L and R channels)
Measurement point	Line output L (R) (terminated with 47kΩ)
Instrument	Audio level meter
Specified value	–7.5 ± 2dBs

(Check Methods)

1) Sound output L (R) level should be –7.5 ± 2dBs.

5. Checking of overall level characteristics

Mode	Repeated self recording (SP and LP modes)
Signal	400Hz, –7.5dBs: Sound input (both L and R channels)
Measurement point	Line 1 output L (R) (terminated with 47kΩ)
Instrument	Audio level meter
Specified value	–7.5 ± 3dBs

(Check Methods)

1) Record the signal.
2) Playback recorded part.
3) Sound output level should be –7.5 ± 3dBs.
4) Adjust RV902 and RV802 again if the output level is not within specified value.

6. Checking of overall frequency characteristics

Mode	Repeated self recording (LP mode)
Signal	Ⓐ 400Hz, –17.5dBs Ⓑ 30Hz, –17.5dBs © 14kHz, –17.5dBs Sound output (both L and R channels)
Measurement point	Sound output L (R)
Instrument	Audio level meter
Specified value	Assuming 0dB of 400Hz playback output level, playback output levels of 30Hz and 14kHz should be 0 ± 3dB.

(Check Methods)

1) Record signals Ⓐ ~ © sequential.
2) Playback recorded part.
3) Assuming 0dB of 400Hz playback output level, playback output levels of 30Hz and 14kHz should be 0 ± 3dB.

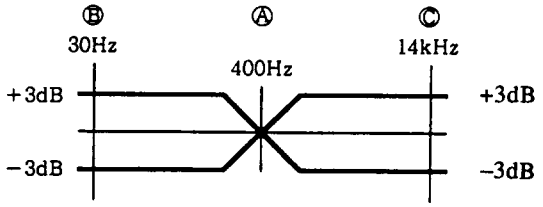


Fig. 9-24 Checking of overall frequency characteristics

7. Checking of overall distortion rate

Mode	Repeated self recording (LP mode)
Signal	1kHz, –7.5dBs: Line 1 input (both L and R channels)
Measurement point	Sound output L (R) (terminated with 47kΩ)
Instrument	Distortion meter
Specified value	1.0% or less (with distortion rate measuring filter in use)

(Check Methods)

1) Record the signal.
2) Playback recorded part.
3) Distortion rate should be 1.0% or less.

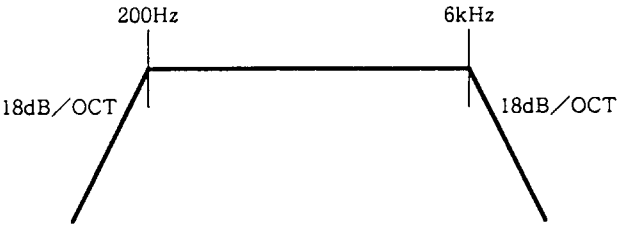


Fig. 9-25 Filter for measuring distortion rate

8. Checking of overall noise level

Mode	Repeated self recording (LP mode)
Signal	No signal Insert the 600Ω shorting plug into both sound input L and R terminals.
Measurement point	Sound output L (R)
Instrument	Audio level meter
Specified value	–55dBs or less *

(Checking Methods)

1) Record the signal.
2) Playback recorded part.
3) Difference between noise level and checked overall level characteristics should be 55dB or above. *

* With IHF-A listening compensation filter in use

9-7. ADJUSTMENT OF TUNER SYSTEM

9-7-1. Adjustment of AGC (TU-100 board)

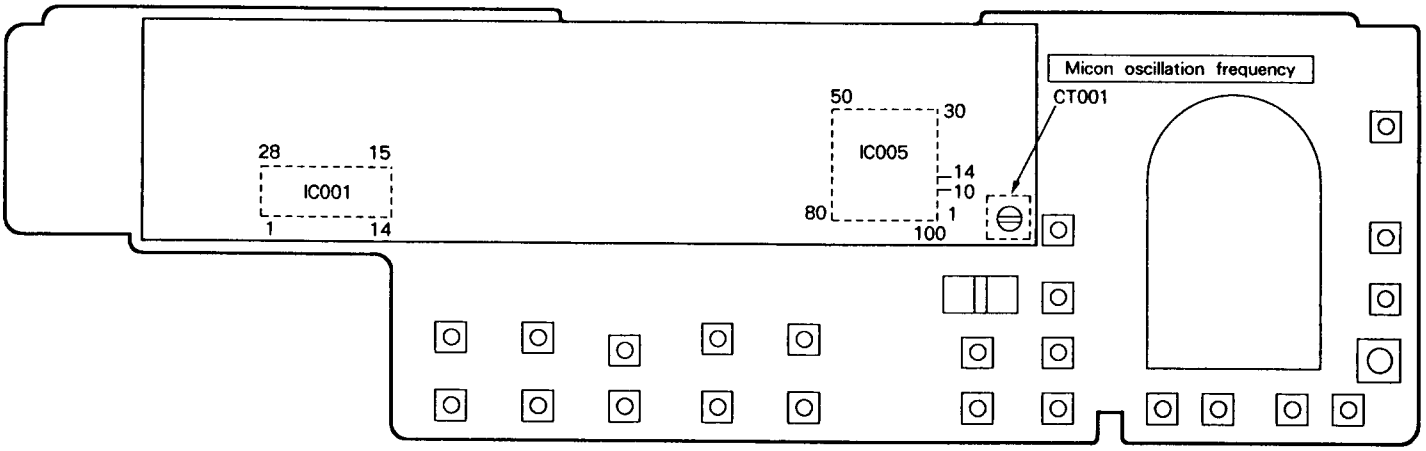
Mode	EE
Signal	TV signal (62dBμ)
Measurement point	Pin ①, IF001
Instrument	Tester
Adjustment element	AGC VR (IF001)
Specified value	6 ± 0.3V

(Adjustment Methods)

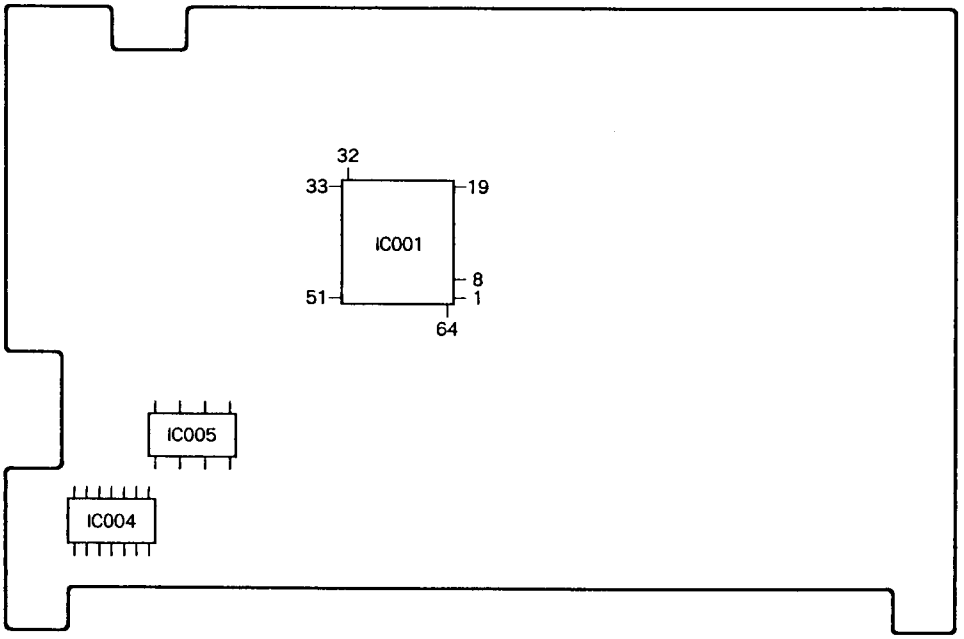
1) Adjust AGC VR for the voltage of 6 ± 0.3V.
2) Enter the TV signal of 60dBμ and check for the voltage of 7V or above.

9-8. ARRANGEMENT DIAGRAM FOR ADJUSTMENT PARTS

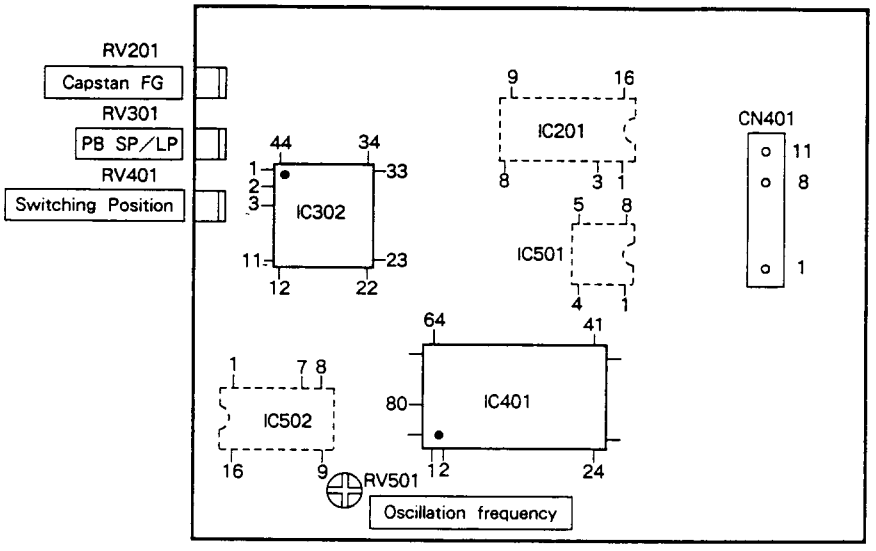
FR-60 BOARD (CONPONENT SIDE)



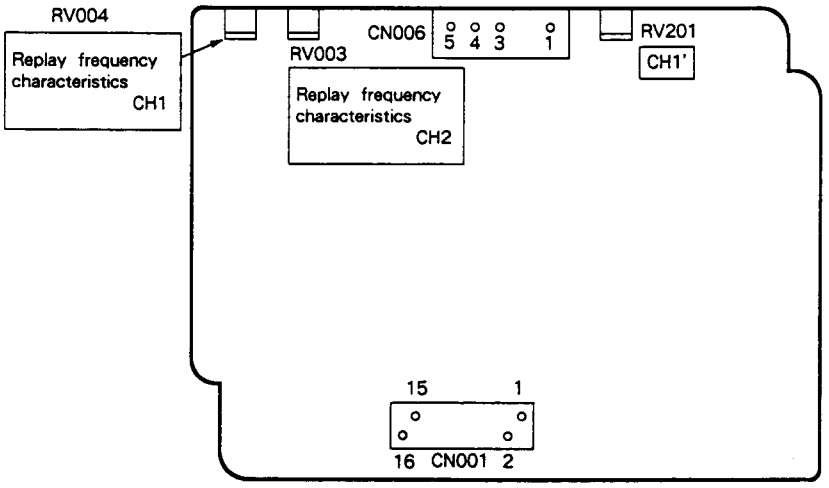
ST-41 BOARD (CONDUCTOR SIDE)



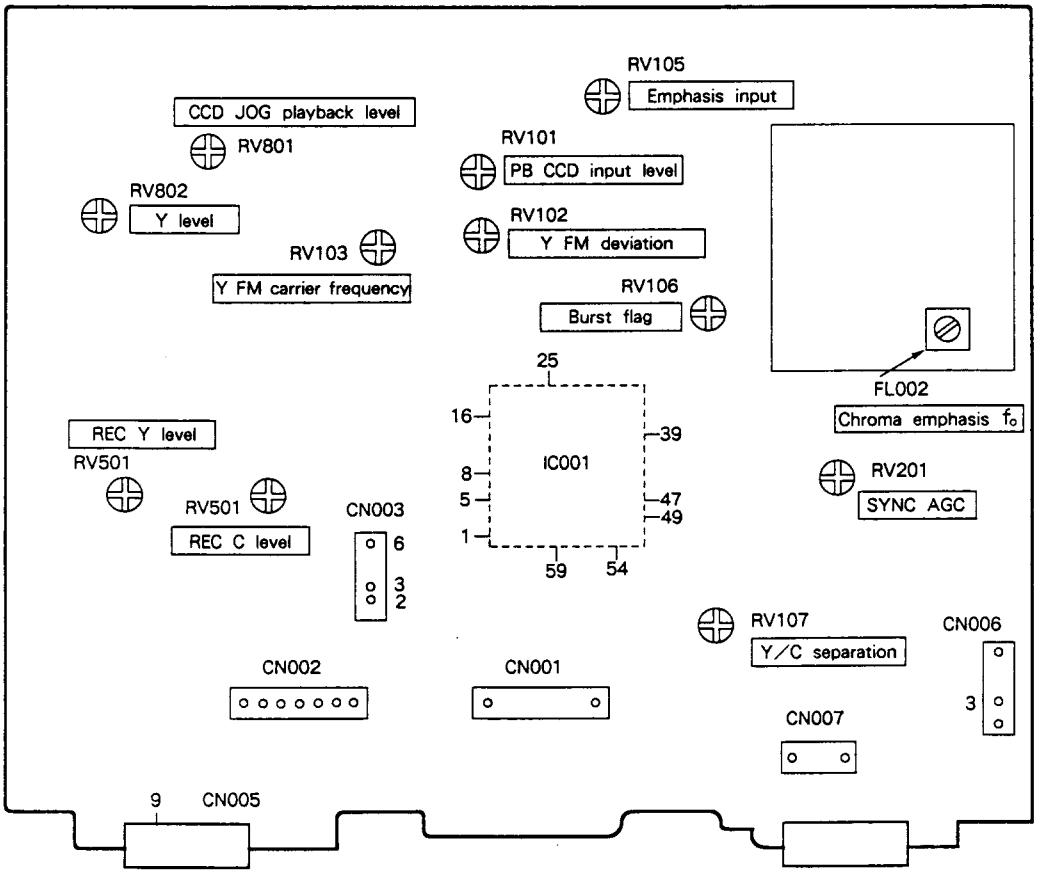
CM-13 BOARD (COMPONENT SIDE)



RP-69 BOARD (COMPONENT SIDE)

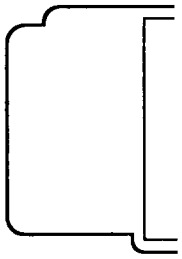


VI – 96 BOARD (COMPONENT SIDE)

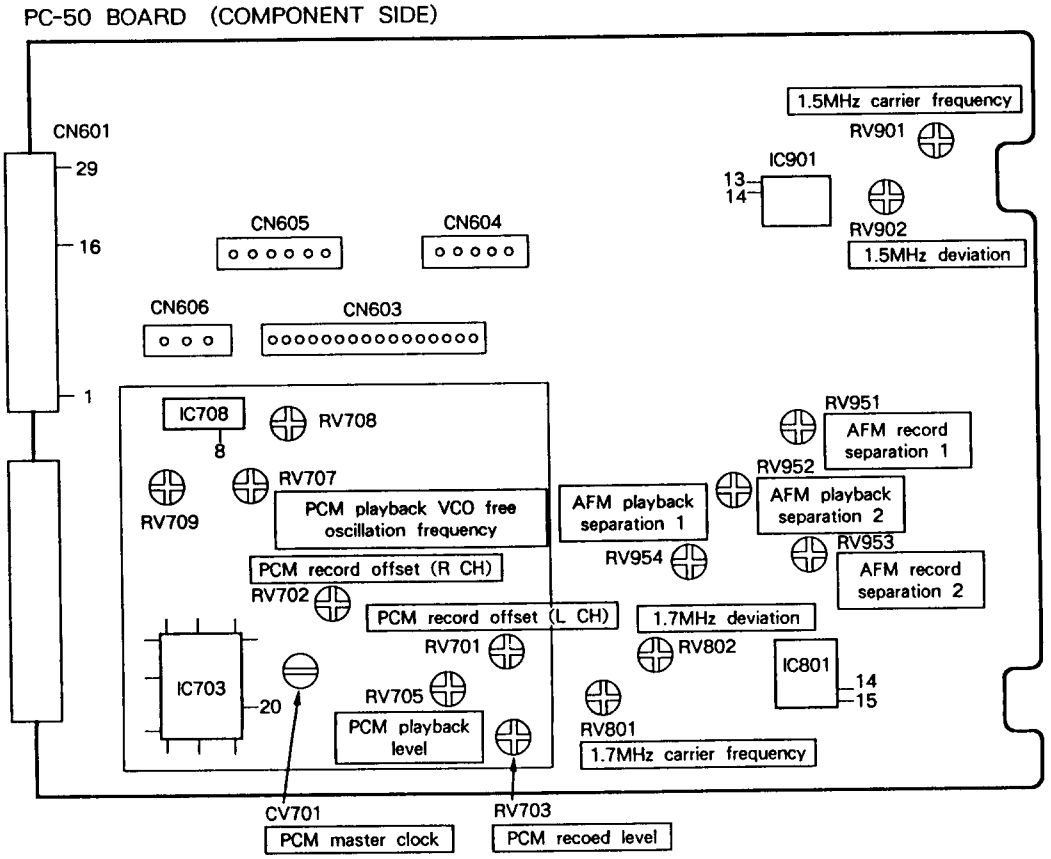


9-8. ARRAN(

FR-60 BOARD



PC-50 BOARD (COMPONENT SIDE)



TU-100 BOARD (CONPONENT SIDE)